KUNDENDIENST

ITT Graetz

SERVICE

MANUAL

Einstellanweisung der Mechanik und Elektronik

Mechanical and Electronic Adjustments

Teil 2 / Part 2

VR 119-2

1985

VIDEORECORDER 3906, 3916
TELERECORDER 4906, 4916

VHS
88:88
TELERECORDER 4906
Graetz

VHS
88:88
VR 3906
ITT

Dieses Manual gilt in Verbindung mit folgenden Manualen:

VR 119-1	Schaltbilder – Lagepläne Bestell-Nr. 6611 8216
VR 119-2	Einstellanweisung der Mechanik und Elektronik Bestell-Nr. 6611 8217
VR 119-3	Ersatzteile-Listen Bestell-Nr. 6611 8218

This manual is to be used in conjunction with the following Service Manuals:

VR 119-1	Schematic Diagrams – Circuit Boards Part. No. 6611 8216
VR 119-2	Mechanical and Electronic Adjustments Part. No. 6611 8217
VR 119-3	Spare Parts Lists Part. No. 6611 8218

Bei Reparaturen gültige Sicherheitsvorschriften beachten!

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2. Einstellanweisung der Mechanik

2.1 Allgemeine Hinweise

1. Zum Austausch oder Entlöten von Bauteilen Gerät vom Netz trennen.
2. Bei der Demontage mechanischer Teile ist darauf zu achten, daß keine Schrauben oder Kleinteile ins Laufwerk fallen, anderenfalls sind diese vor Wiederinbetriebnahme zu entfernen.
2. Während des Arbeitens an der Mechanik ist sorgfältig darauf zu achten, Beschädigungen sowohl der oberen als auch der unteren Kopftrommeleinheit zu vermeiden.
4. Die Mechanik des Bandlaufwerks wurde im Werk präzise eingestellt und bedarf im Normalfall keiner Nachjustage.
5. Beim Austausch von Teilen sind Beschädigungen und Dejustagen anderer Komponenten sorgfältig zu vermeiden. Dabei ist besonders auf die Bandführungsbolzen und die rotierenden Videoköpfe zu achten.

2.1.2 Erforderliche Testausrüstung, Lehren und Werkzeuge

Zur einwandfreien Einstellung der Geräte sind die folgenden Lehren und Werkzeuge unbedingt erforderlich. Ohne sie wäre eine lange Test- und Fehlersuchzeit erforderlich, was zu möglichen Schäden führen kann. Zusätzlich werden die üblichen Werkzeuge und ein metrischer Sechskantschlüssel benötigt.

Erforderliche Testvorrichtung:

Farbfernsehgerät oder Monitor
Oszilloskop: Breitband, Zweikanal, getriggert, Sweepverzögerung
Aufzeichnungsband
Abgleichbänder

2. General Mechanical adjustment

2.1 Important precautions

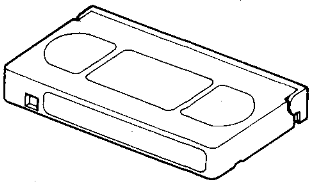
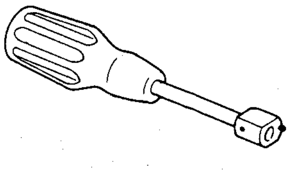
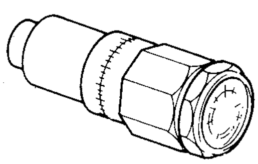
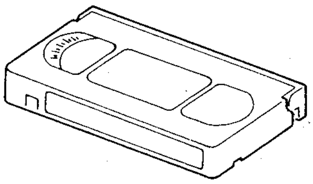
1. Disconnect from power before removing or soldering components.
2. When removing a screw from the chassis, be careful not to drop it into the mechanism. If a screw should be dropped, be sure to retrieve it.
3. Be extremely careful not to damage either the upper or lower head drum assemblies.
4. The tape transport mechanism has been precisely adjusted at the factory and ordinarily does not require readjustment.
5. When removing a part, be very careful not to damage or displace other parts. (Be especially careful with the guide poles and rotary video head drum.)

2.1.2 Required test equipment, jigs and tools

For proper mechanical adjustment, the following jigs and tools are strongly recommended. Without them, a long trial-and-error period would be necessary, resulting in possible damage. In addition, general-purpose tools and a metric hex key (obtain locally) are required.

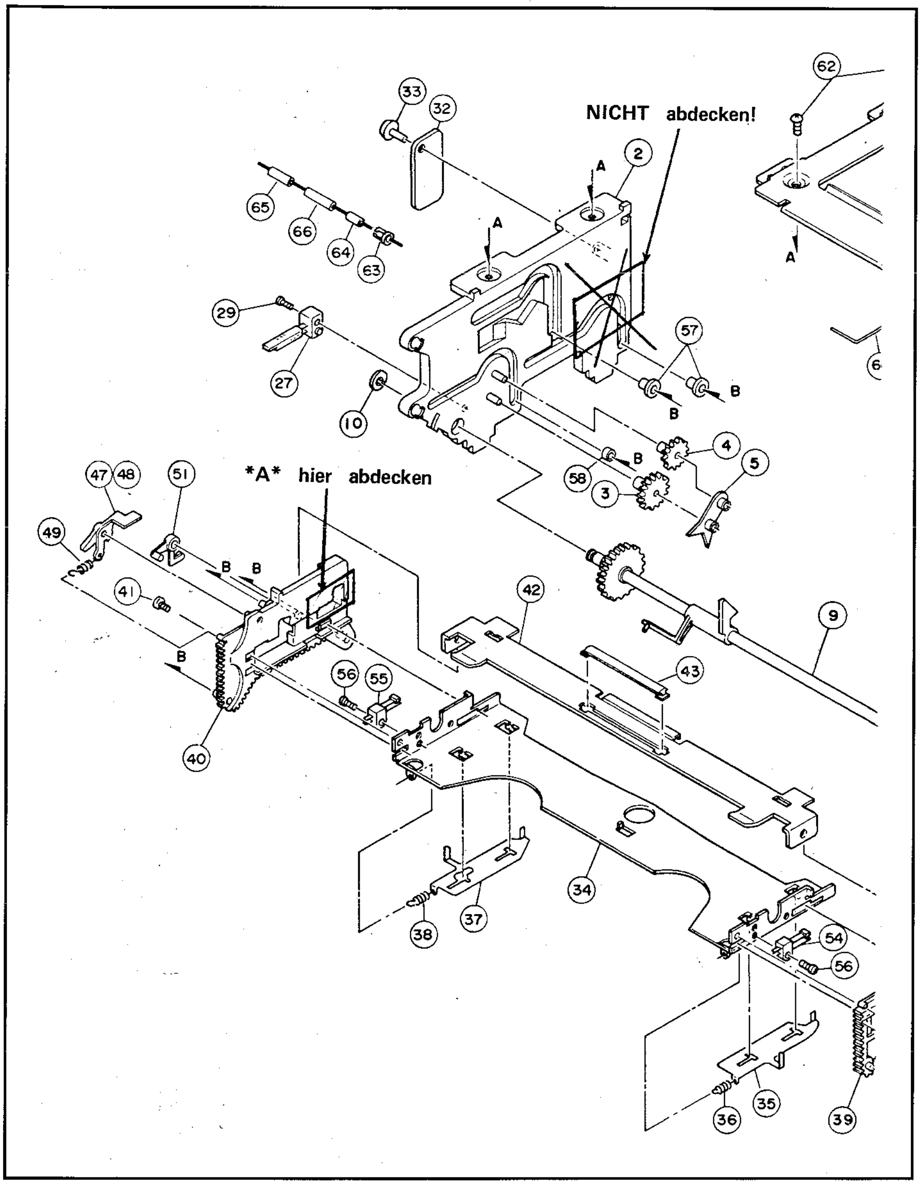
Test equipment required:

Color television or monitor
Oscilloscope: wide-band, dual trace, triggered, delayed sweep
Recording tape
Alignment tapes

Abgleichband Alignment Tape MH-2 		
Konischer Hohlschlüssel Tapered nut driver 	Drehmomentmesser mit Adapter Torque Gauge Ass'y 	Bremszug-Meßkassette Back Tension Cassette Gauge 

Tabelle/Table 2-1-1 Lehren und Werkzeuge / *Jigs and tools*

Hinweis:
Note:



Hinweis: Im Servicefall ist es oftmals erforderlich, den Videorecorder ohne eingelegte Cassette in den Wiedergabe-Aufnahmebetrieb zu schalten. Hierzu sollte folgendermaßen vorgegangen werden:

1. Die Bandanfang-Endesensoren müssen mit einem schwarzen Klebeband abgedeckt werden. Da dies NICHT unmittelbar an den Sensoren selbst erfolgen darf, muß dies für beide Sensoren an der bezeichneten Stelle *A* erfolgen. Darauf achten, daß kein Fremd-Streulicht die Sensoren trifft. Eventuell den Cassettenschacht abdecken.

2. Über einen 1 kOhm Widerstand den Pin 31 des uP-IC´s 601, auf der MAIN-Platte 0 2 , nach Masse kurzschließen, bis der Cassettenschacht vollständig eingefahren ist. Danach kann der Recorder in den Wiedergabebetrieb geschaltet werden. Für Aufnahme ist lediglich noch der auf der Achse mit Pos.-Nr. 9 sitzende REC-SAFETY-Hebel zu betätigen.

Important: For effecient servicing, it is often necessary to switch the equipment to the play-record mode without a cassette compartment. This requires the following actions:

1. The tape end photo sensors must be covered with black tape. Since the sensors must not be covered directly, covering takes place at the point marked *A*. Ensure that no stray light is able to reach the sensors. If necessary, cover the cassette compartment.

2. Connect pin 31 of IC uP 601 on MAIN BOARD 0 2 via a 1 kOhm resistor to earth, until the cassette lift is all the way lowered. The recorder can then be switched to the play mode. To switch from the play to the recording mode, it is then only necessary to operate the REC-SAFETY lever on the shaft assigned Pos.-No. 9.

2.1.3 Demontage

1. Gehäuseoberteil und Grundplatte

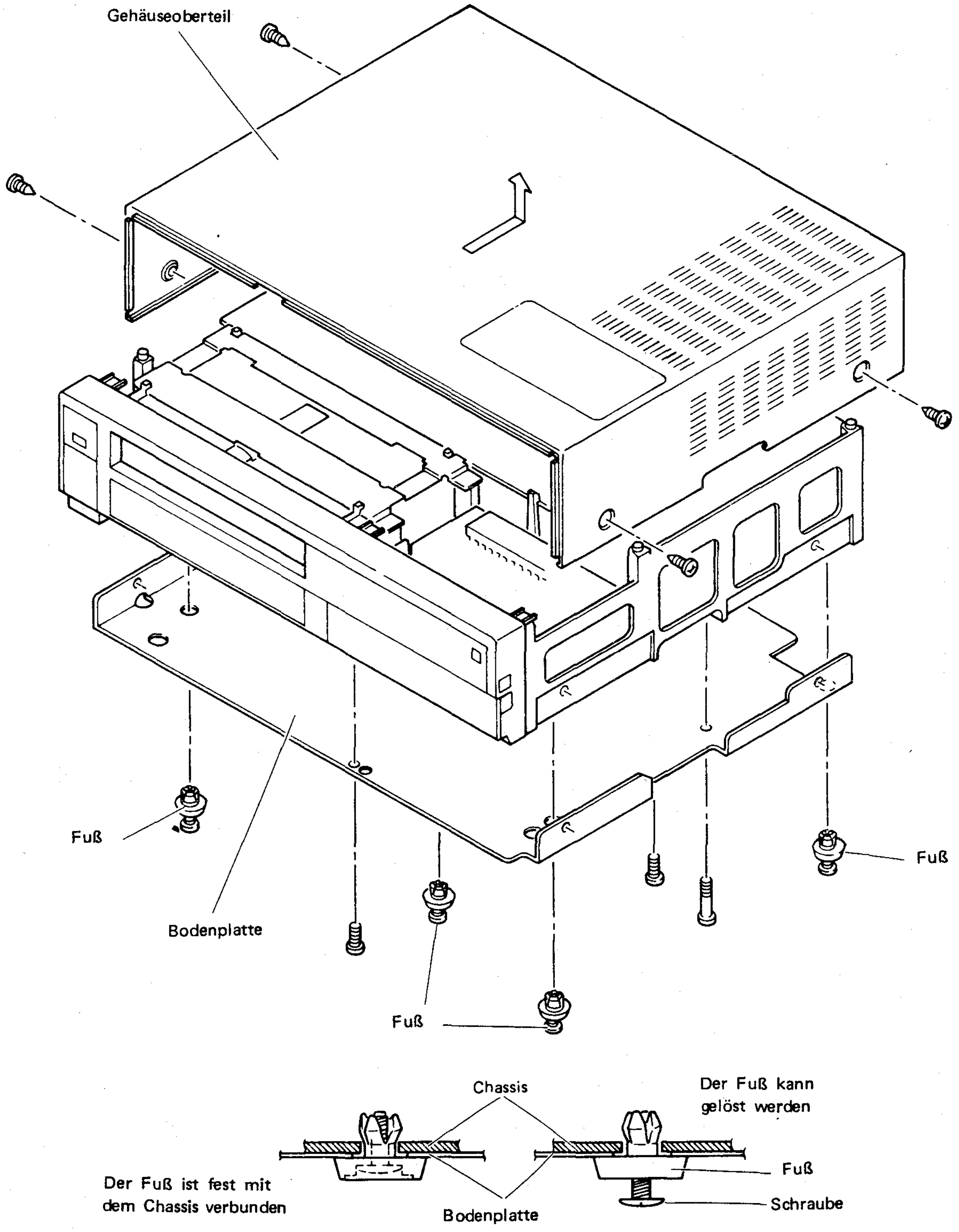

Gehäuseoberteil
Fuß
Bodenplatte
Fuß
Fuß
Fuß
Chassis
Der Fuß kann gelöst werden
Fuß
Schraube
Der Fuß ist fest mit dem Chassis verbunden
Bodenplatte

Abb. 2-1-1 Gehäuseabdeckungen

2. Frontplatte und Rückwand Cassettenklappen

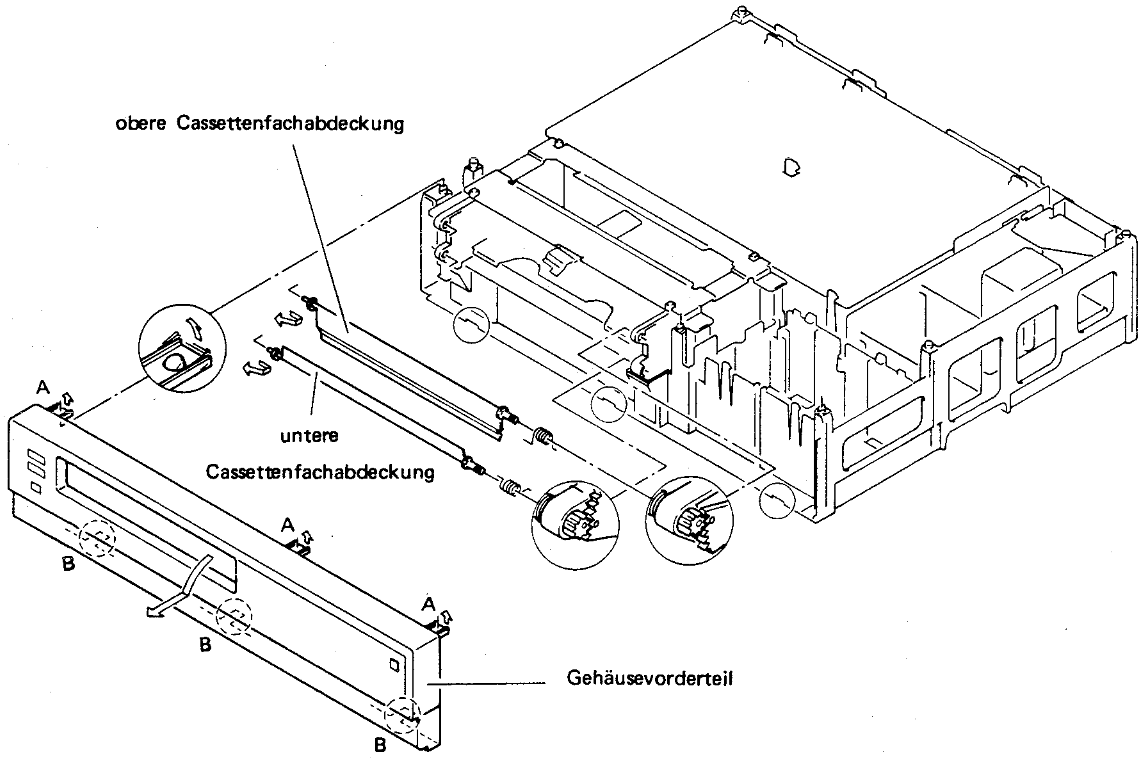

obere Cassettenfachabdeckung
untere Cassettenfachabdeckung
A
A
A
B
B
B
Gehäusevorderteil

Abb. 2-1-2 Frontplatte und Rückwand

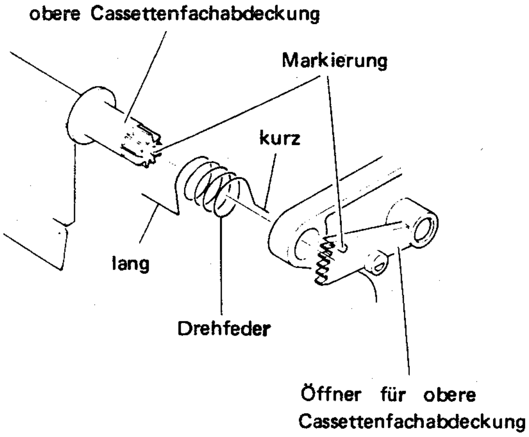

obere Cassettenfachabdeckung
Markierung
kurz
lang
Drehfeder
Öffner für obere Cassettenfachabdeckung

Abb. 2-1-3 Cassettenklappen

2.1.4 Lage wichtiger mechanischer Teile

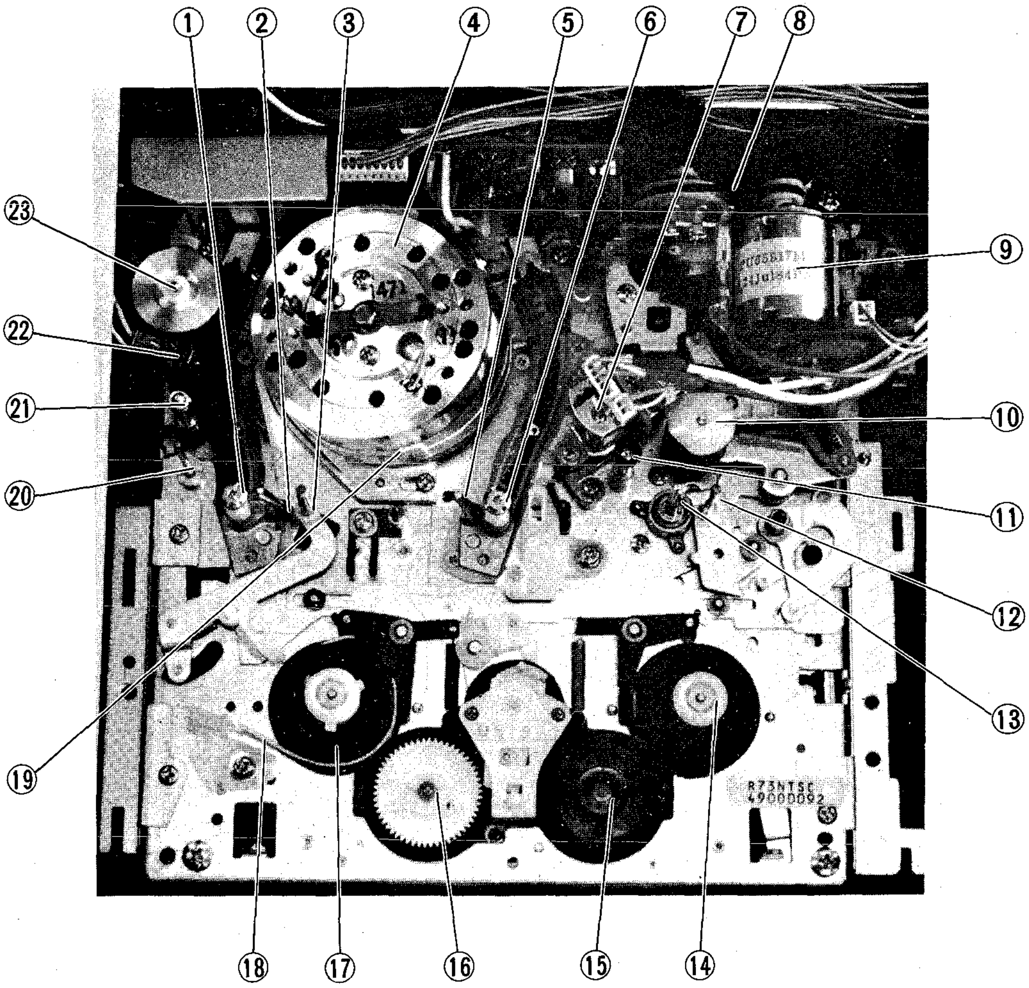


Abb. 2-2-1 Draufsicht

1 Abwickelführungsrolle
2 Schrägführungsbolzen
3 Fühlhebelstift
4 Obere Kopftrommel
5 Schrägführungsbolzen
6 Aufwickelführungsrolle
7 Audio/Kontrollkopf
8 Einfädelriemen
9 Fädelmotor
10 Gummiandruckrolle
11 Aufwickelführungsstift
12 Führungsarm
13 Bandantriebswelle
14 Aufwickelspulenteller
15 Aufwickeltellerkupplung
16 Abwickeltellerkupplung
17 Abwickelspulenteller
18 Bandzugbremsband
19 Kopftrommelunterteil
20 Abwickelführungsstift
21 Abwickelführungsbolzen
22 Gesamtlöschkopf
23 Spannrolle
24 Cassettenschachtmotor

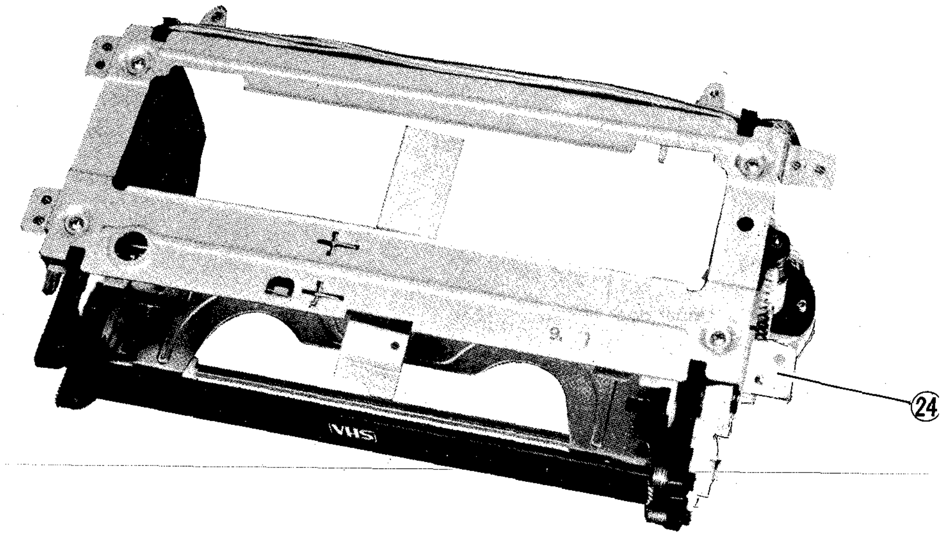


Abb. 2-2-2 Cassettenschacht

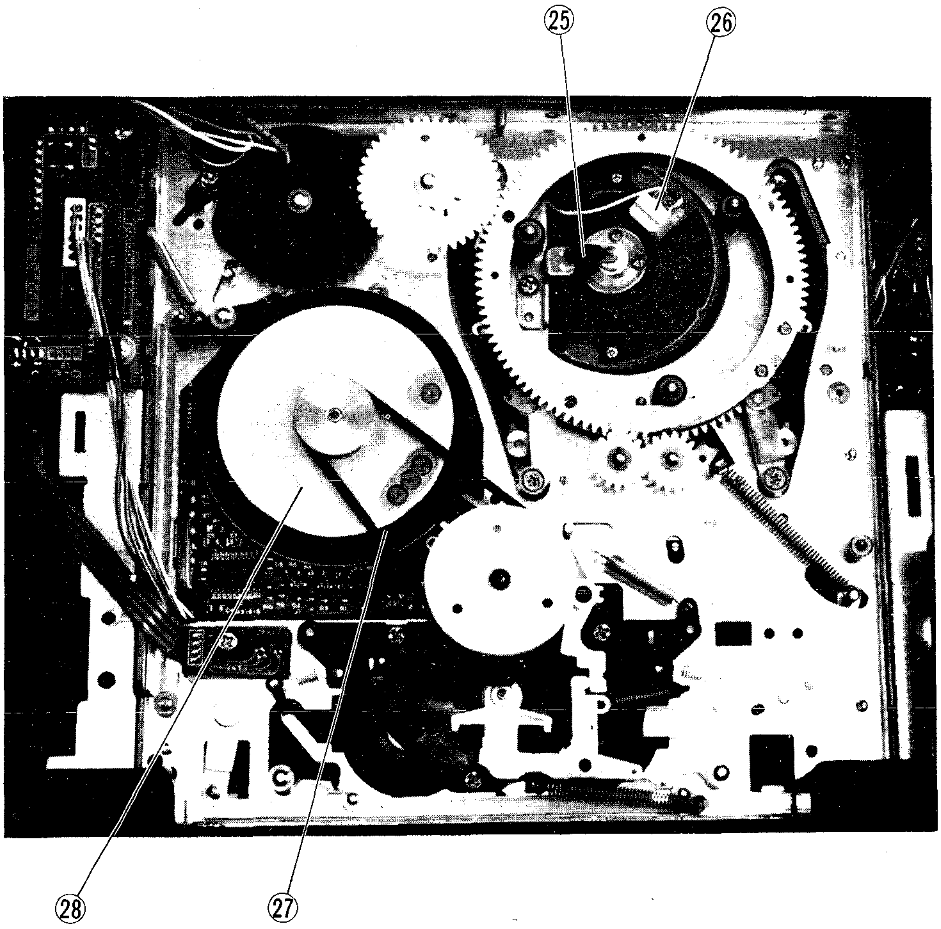


Abb. 2-2-3 Unteransicht

25 Kontaktfeder
26 Kopfphasenlage-Abtastkopf
27 Wickelradriemen
28 Capstanmotor

2.3 Auswechseln der wichtigsten Baugruppen

Zum Auswechseln des defekten Teils, Gehäuse, gedruckte Platten usw. den Erfordernissen entsprechend abnehmen bzw. ausbauen.

2.3.1 Cassettenschacht
Ausbau

1. Die zwei Schrauben① lösen und die MAIN-Platte 0 2 aus den Haltenasen nach hinten ausschwenken und einrasten.
2. Stecker CN 1 (von der MAIN-Platte kommend) von der Cassettenschacht-Sensorplatte 1 5 abziehen.
3. Die vier Blechschrauben②, die Massefedern und die Ösen lösen.
4. Cassettenschacht vorsichtig nach oben abnehmen.

Betrieb des Gerätes ohne eingelegte Cassette

Für Servicefälle bei Inbetriebnahme des Gerätes ohne daß das Band um die Kopftrommel geschlungen wird, den Cassettenschacht aus dem Gerät nehmen. Dabei wie folgt vorgehen:

1. Isoliermaterial (Pappe, Plastik etc.) auf die rechte Seite des Chassis (oberhalb der Abstimm-Netzteilplatte) legen.
2. Cassettenschacht aus dem Gerät nehmen und auf Isolation am Chassis legen. Den Stecker am Cassettenschacht-Sensor 1 5 NICHT abziehen.
3. Cassette ins Cassettenfach einlegen und warten bis der Lift die Cassette nach unten gefahren hat. In diesem Betriebszustand können Laufwerksfunktionen ohne weiteres überprüft werden. Beim Schnellen Rückspulen muß der Aufwickelteller von Hand mitgedreht werden, da sonst die Elektronik auf Blockade schaltet.

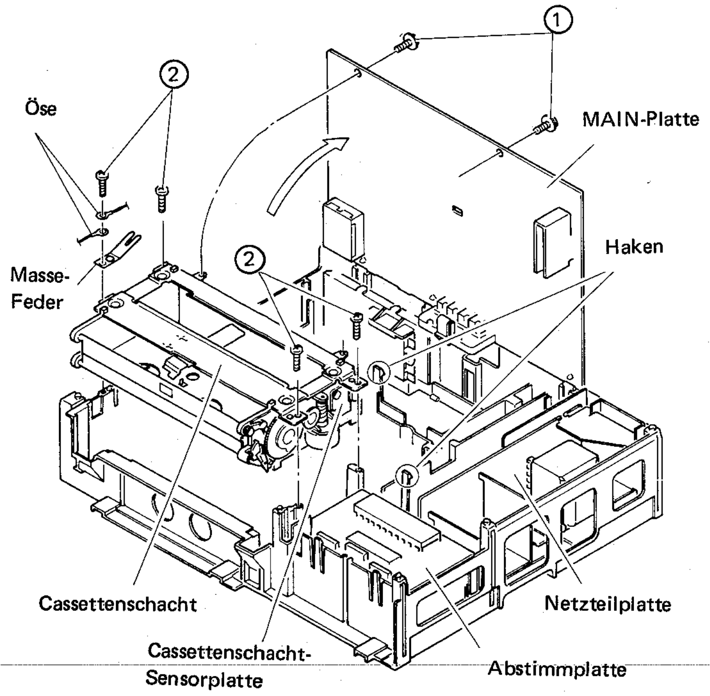


Abb. 2-3-1 Ausbau des Cassettenschachtes

2.3.2 Obere Kopftrommel

1. Die vier Drähte an der oberen Kopftrommel ablöten. Dies sollte schnell geschehen, um die Drähte nicht zu beschädigen.
2. Zwei Schrauben① lösen und obere Kopftrommel nach oben abnehmen.
3. Unterseite der neuen, oberen und Oberseite der unteren Kopftrommel vorsichtig mit Alkohol säubern. Darauf achten, daß die Kopfspitzen und die Lauffläche nicht beschädigt bzw. zerkratzt wird.
4. Beim Einbau der Kopftrommel in umgekehrter Reihenfolge zum Ausbau verfahren. Beim Anlöten der Drähte darauf achten, daß die Drähte nicht vertauscht werden. Die Lötwärme möglichst gering halten.

Farbe der Löt-Pins	Kanal	Innere/äußere Drahtfarbe
Braun	CH-1	Braun/Grün
Rot	CH-2	Rot/Weiß (farblos)

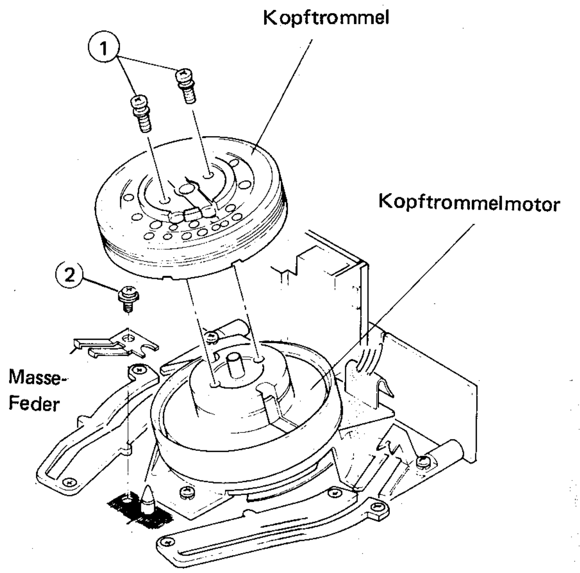


Abb. 2-3-2 Auswechseln der Kopftrommel

2.3.3 Hauptlöschkopf

1. Stecker CN 1 vom Hauptlöschkopf abziehen.
2. Schraube① lösen und Kopf vom Hauptlöschkopfarm abziehen.
3. Beim Einbau in umgekehrter Reihenfolge verfahren

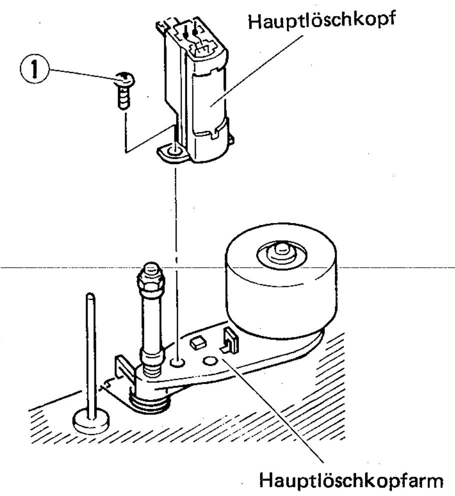


Abb. 2-3-5 Ausbau des Hauptlöschkopfes

2.3.4 Audio-Synchronkopf

1. Stecker CN 1 und CN 2 von der Audio/Synchronkopfplatte abziehen.
2. Nach Lösen der Schraube① den Kopf mit der Hauptlöschkopfplatte abnehmen.
3. Die sechs von den Köpfen kommenden Leitungen ablöten und Audio/Synchronkopfplatte abnehmen.
4. Mittels Schraube② die Abschirmkappe lösen.
5. Mit den Schrauben③ den Audio/Synchronkopf von der Hauptlöschkopfplatte lösen. Auf die Federn achten.

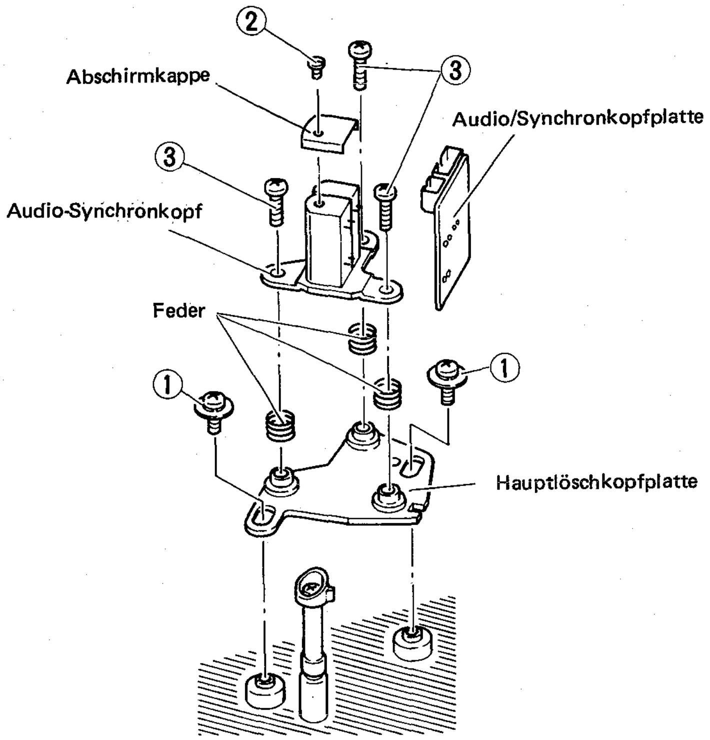

②
Abschirmkappe
③
Audio/Synchronkopfplatte
③
Audio-Synchronkopf
Feder
①
①
Hauptlöschkopfplatte

Abb. 2-3-6 Austausch des Audio/Synchronkopfes

6. Der Einbau erfolgt in umgekehrter Reihenfolge. Dabei muß vor der Endmontage der Abstand von Kopf zu Hauptlöschkopfplatte nach untenstehender Anleitung eingestellt werden.
7. Bandlauf-Einstellungen vornehmen.

2.3.5 Andruckrolle

1. Federringe① und② ausklinken und Andruckrollenarm nach oben abnehmen.
2. Achse der Andruckrolle reinigen und ölen.
3. Der Wiedereinbau erfolgt in umgekehrter Reihenfolge zum Ausbau. Die Andruckrolle muß frei von jeglichen Ölspuren sein.

2.3.6 Capstan-Motor

1. Den Führungsarm nach Lösen der Schraube① mit der Feder herausnehmen.
2. Stecker CN 3 von der Verbindungsplatte 2-0 abziehen.
3. Wickelteller-Antriebsriemen vom Capstanmotor und von der Rolle der Kupplungsmechanik aushängen.
4. Die drei Schrauben② herausdrehen und Capstanmotor nach unten abnehmen. Auf Motorbremse achten!
5. Der Wiedereinbau des Capstanmotors erfolgt in umgekehrter Reihenfolge zum Ausbau.

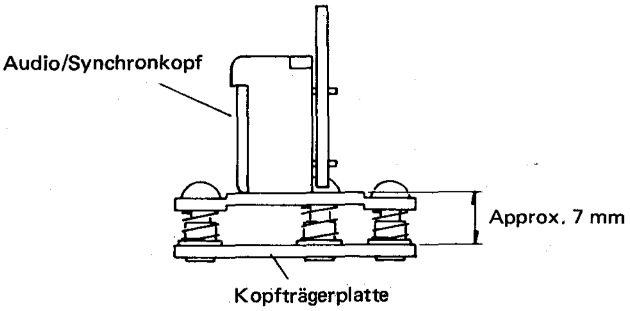

Audio/Synchronkopf
Approx. 7 mm
Kopfträgerplatte

Abb. 2-3-7 Audio/Synchronkopfhöhe

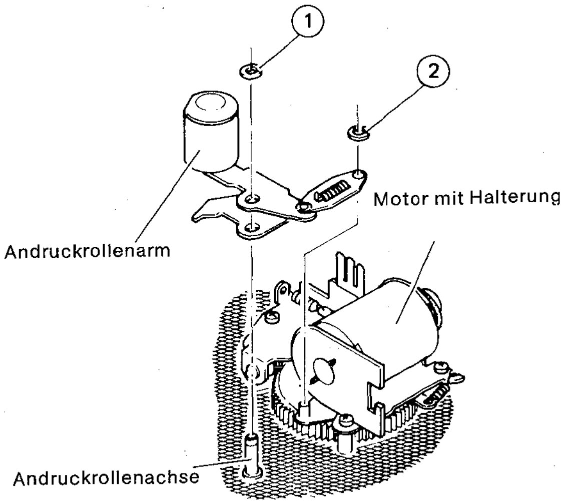

①
②
Motor mit Halterung
Andruckrollenarm
Andruckrollenachse

Abb./Fig. 2-3-8 Ausbau der Andruckrolle

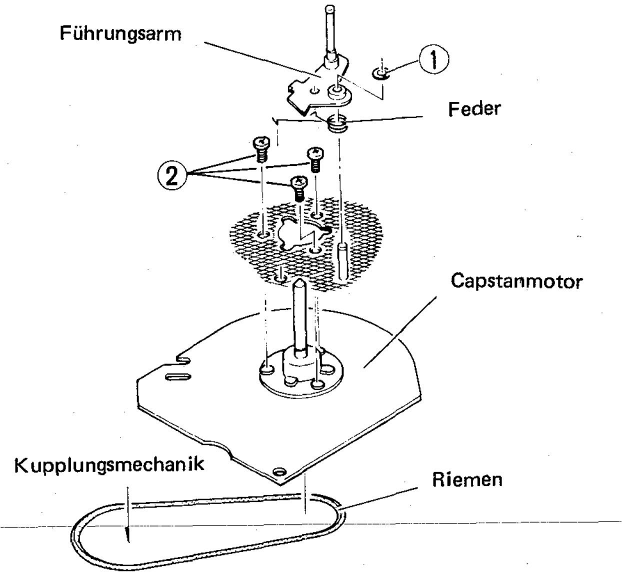

Führungsarm
①
Feder
②
Capstanmotor
Kupplungsmechanik
Riemen

Abb. 2-3-9 Ausbau des Capstanmotors

2.3.7 Betriebsart-Steuermotor

1. Mittels Lösen der Schrauben①②und③das komplette Laufwerk nach oben herausnehen.
2. Den Riemen von der Motorachse abnehmen.
3. Stecker CN 1 von der Betriebsart-Steuermotor-Platte 3 0 abziehen. Schrauben④und⑤lösen, den Motor auslöten und herausnehmen.
4. Beim Einbau auf Motorpolarität achten (+ Seite oben).

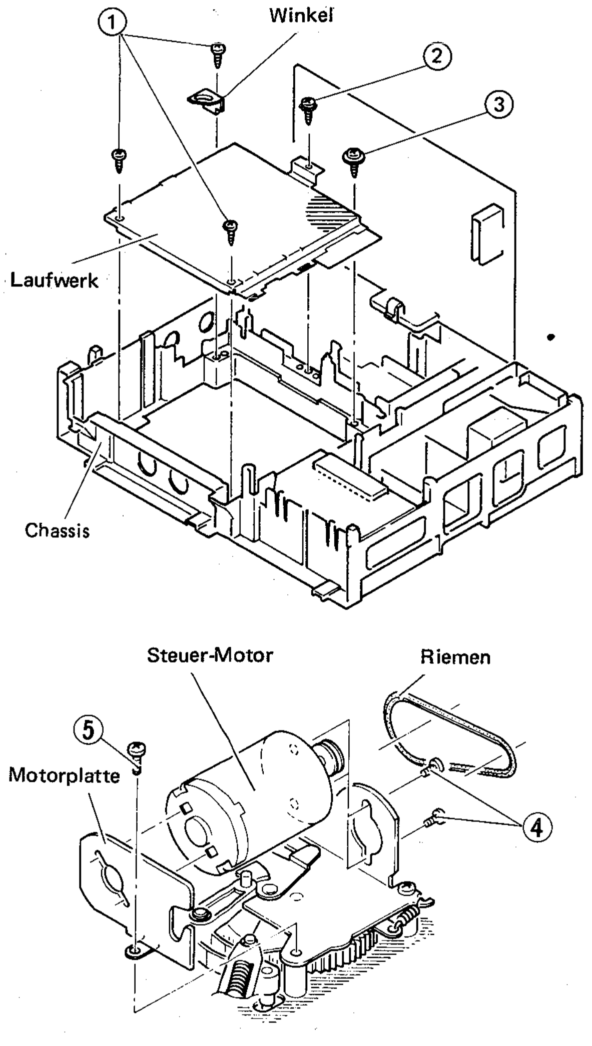

①
Winkel
②
③
Laufwerk
Chassis
Steuer-Motor
Riemen
⑤
Motorplatte
④

Abb. 2-3-10 Austausch des Steuer-Motors

2.3.8 Cassettenschacht-Motor

1. Cassettenschacht ausbauen.
2. Die zwei Drähte am Cassettenschacht-Motor ablöten.

Leitungsanschluß an:	Farbe
dicker Nabe	weiß
dünner Nabe	grau

3. Zwei Schrauben①entfernen und Cassettenmotor abnehmen.
4. Beim Wiedereinbau des Motors in umgekehrter Reihenfolge zum Ausbau verfahren. Polarität der Drähte beachten!
5. Cassettenschacht wieder einbauen.

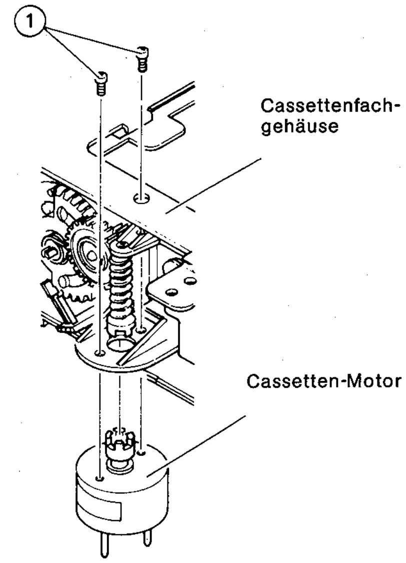

①
Cassettenfach-
gehäuse
Cassetten-Motor

Abb./Fig. 2-3-11 Ausbau des Cassettenmotors

2.3.9 Wickelteller

* Abwickelteller

1. Federring①ausklinken und Abwickeltellerbremse mit Feder entfernen.
2. Schraube②lösen und Spannband zur Seite schwenken.
3. Federring③ausklinken und Abwickelteller vorsichtig nach oben abnehmen. Vorsicht bei Unterlegscheiben!
4. Nach der Reinigung mit Alkohol, Wickeltellerachse mit einem Tropfen Nähmaschinenöl ölen. Nicht übermäßig ölen!
5. Abwickelteller wieder einbauen.
6. Spannband wieder in seine ursprüngliche Lage bringen und Abwickeltellerbremse wieder einbauen. Lage des Bandzugfühlers überprüfen (siehe Abschnitt 2.4.4).

* Aufwickelteller

1. Federring①ausklinken und Aufwickelteller bei gleichzeitiger Betätigung der Aufwickelteller-Einfädelbremse nach oben abnehmen. Auf Unterlegscheiben achten!

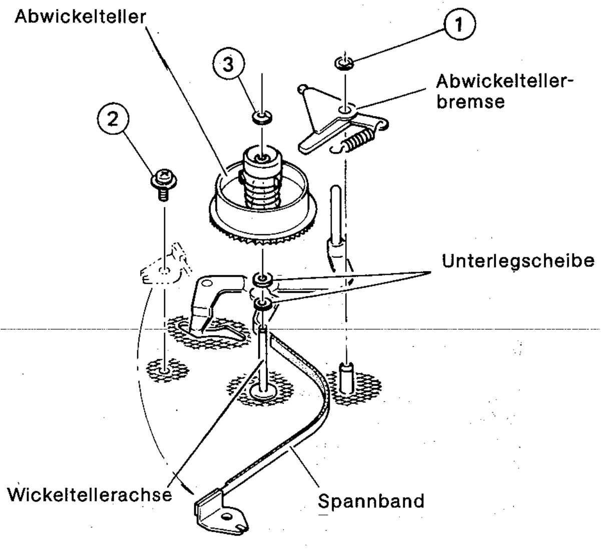

Abwickelteller
①
③
Abwickelteller-
bremse
②
Unterlegscheibe
Wickeltellerachse
Spannband

Abb./Fig. 2-3-12 Ausbau des Wickeltellers

2. Nach der Reinigung mit Alkohol, Wickeltellerachse mit einem Tropfen Nähmaschinenöl ölen. Nicht übermäßig ölen!

3. Der Einbau erfolgt in umgekehrter Reihenfolge.

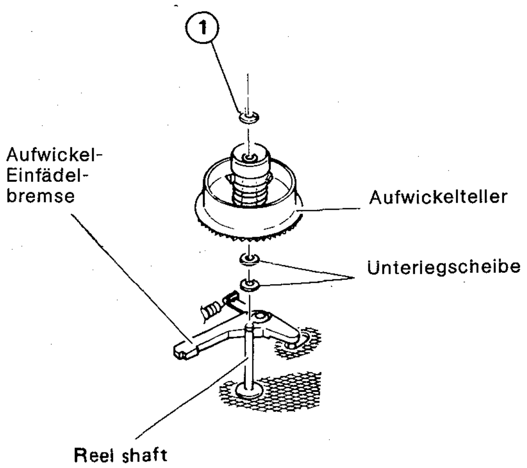

①
Aufwickel-
Einfädel-
bremse
Aufwickelteller
Unterlegscheibe
Reel shaft

Abb./Fig. 2-3-13 Ausbau des Aufwickeltellers

2.3.10 Kupplungsmechanik

* Aufwickel-Abwickeltellerkupplungen

1. Aufwickelteller ausbauen

2. Federring ① ausklinken und unter gleichzeitigem Betätigen der Aufwickeltellerhauptbremse die Kupplung herausnehmen. Auf die Unterlegscheiben unter der Kupplung achten!

3. Nach der Reinigung mit Alkohol, die Achse mit einem Tropfen Nähmaschinenöl ölen. Nicht übermäßig ölen!

4. Beim Wiedereinbau in umgekehrter Reihenfolge vorgehen.

5. Aufwickelteller-Drehmoment überprüfen (siehe Abschnitt 2.4.3)

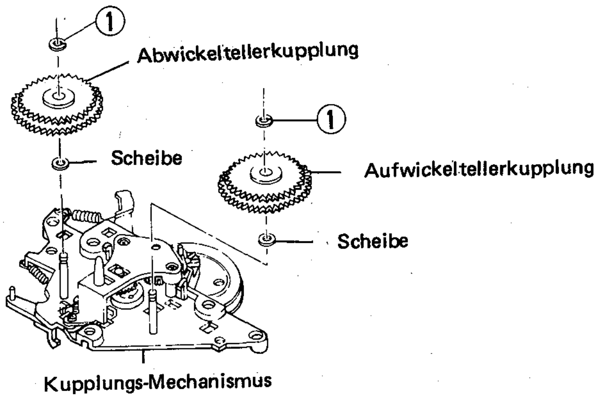

①
Abwickeltellerkupplung
①
Scheibe
Aufwickeltellerkupplung
Scheibe
Kupplungs-Mechanismus

Abb. 2-3-14 Ausbau der Kupplungen

* Kupplungsmechanik

1. Die fünf Federn an der Kupplungsmechanik aushaken. Es sind dies die Federn zur Abwickel-Bandzugbremse, Aufwickel-Bandzugbremse, Hauptbremsschieber, Abwickelteller-Hauptbremse und Aufwickelteller-Hauptbremse.

2. Wickelteller-Riemen von der Rolle der Kupplungsmechanik abnehmen.

3. Schraube ① lösen und die Kupplungsmechanik entfernen.

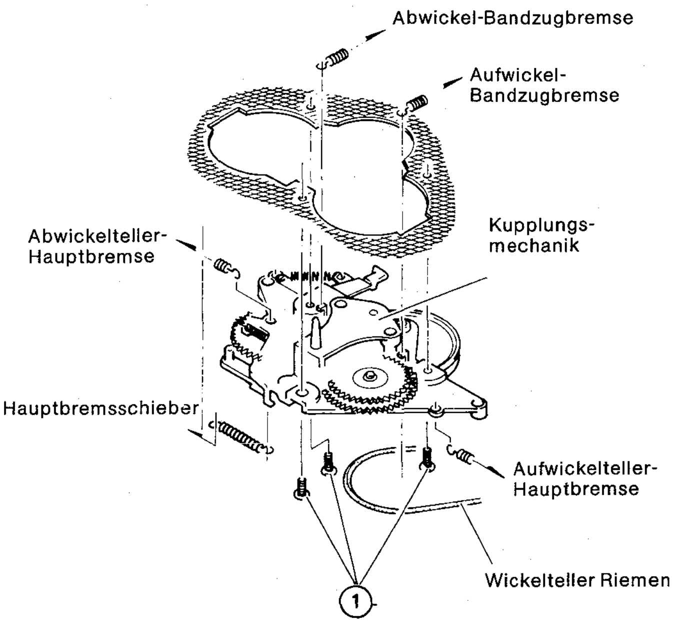

Abwickel-Bandzugbremse
Aufwickel-
Bandzugbremse
Abwickelteller-
Hauptbremse
Kupplungs-
mechanik
Hauptbremsschieber
Aufwickelteller-
Hauptbremse
Wickelteller Riemen
①

Abb./Fig. 2-3-16 Austausch der Kupplungsmechanik

4. Der Einbau erfolgt in umgekenrter Reihenfolge zum Ausbau.

5. Aufwickelteller-Drehmoment überprüfen (siehe Abschnitt 2.4.3)

2.3.11 Schleifer (Bürste)

1. Schraube ① lösen und Schleifer entfernen, Schleifkontakt mit Alkohol reinigen.

2. Schleifer wieder einbauen. Darauf achten daß die Kontaktfläche auf der Mitte des Commutators sitzt.

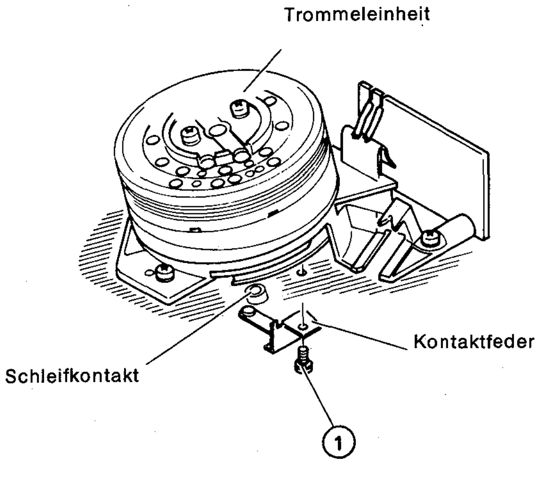

Trommeleinheit
Kontaktfeder
Schleifkontakt
①

Abb./Fig. 2-3-15 Auswechseln des Schleifers

2.3.12 Spannband (Bremsband)

1. Federring ① ausklinken und die Abwickelbandzugbremse abnehmen.

2. Schraube ② lösen und Spannband vom Bandzugarm abnehmen.

3. Der Einbau erfolgt in umgekehrter Reihenfolge.

4. Lage des Bandzug-Fühlhebels und Bandzug überprüfen (siehe Abschnitt 2.4.2 und 2.4.4).

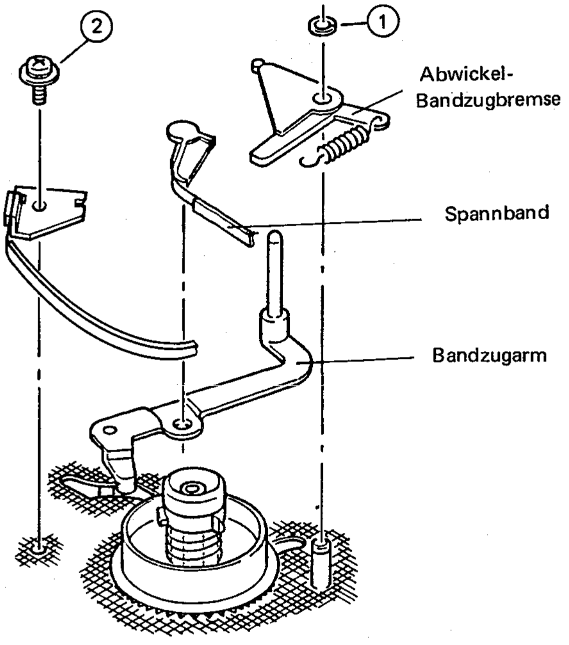

②
①
Abwickel-Bandzugbremse
Spannband
Bandzugarm

Abb. 2-3-17 Auswechseln des Spannbandes

2.3.13 Impulsaufnahme-Kopf

1. Die beiden Drähte an den Lötpunkten des Aufnahmekopfes ablöten.

2. Schraube① herausdrehen und Aufnahmekopf entfernen.

3. Impulsaufnahmekopf in umgekehrter Reihenfolge zum Ausbau wieder einbauen. Beim Anlöten der Drähte auf Polarität achten! Der Aufnahmekopf muß zur Mitte der Kopftrommelachse zeigen.

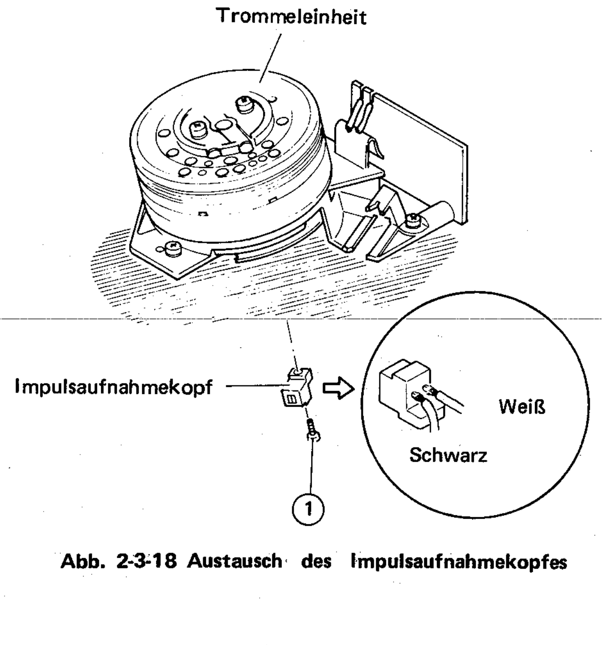

Trommeleinheit
Impulsaufnahmekopf
Weiß
Schwarz
①

Abb. 2-3-18 Austausch des Impulsaufnahmekopfes

2.4 Prüfarbeiten und Einstellungen

2.4.1 Mechanik-Steuerung

* Einfädelkränze und Antriebsrad②

1. Die zwei Löcher im Abwickel- und Aufwickelzahnkranz müssen genau über dem loch im Hauptschassis stehen (Pfeil A in der Abb.). Ist dies nicht der Fall, Zwischenzahnrad② entfernen und Abwickel - und Aufwickelzahnkranz entsprechend ausrichten.

2. Ebenso ist darauf zu achten, daß die Pfeilmarkierung am Zwischenzahnrad②dem Loch B des Abwickelzahnkranzes gegenüber steht. Bei einer eventuellen Abweichung , Zwischenzahnrad ②ausbauen und so wieder einbauen, daß die Pfeilmarkierung dem Loch B gegenüber liegt.

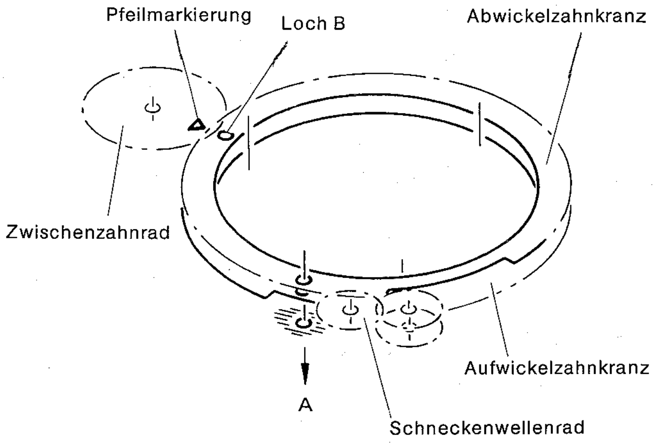

Pfeilmarkierung
Loch B
Abwickelzahnkranz
Zwischenzahnrad
Aufwickelzahnkranz
A
Schneckenwellenrad

Abb./Fig. 2-4-1 Einfädelkranz/Antriebsrad (2)

* Nockenwellenrad (Antriebs - Halterung) und Zwischenzahnrad①

1. Wenn feststeht, daß die beiden Löcher im Nockenwellen- und Zwischenzahnrad genau über dem Loch C liegen, überprüfen ob die Pfeilmarkierung am Zwischenzahnrad der V-Aussparung im Hauptchassis gegenüber liegt. Bei eventuellen Abweichungen, Zwischenzahnrad① ausbauen und so wieder einbauen, daß die Pfeilmarkierung der V-Aussparung gegenüber liegt.

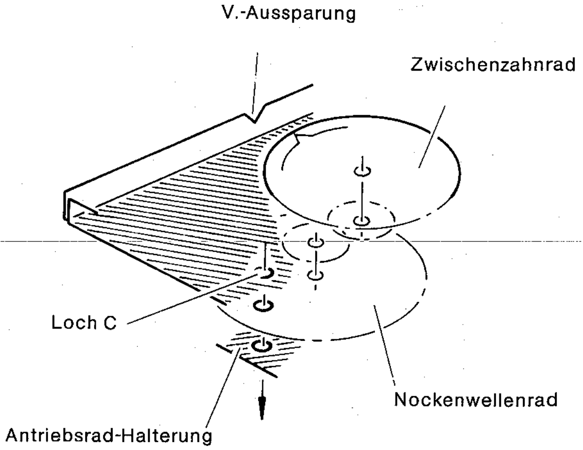

V.-Aussparung
Zwischenzahnrad
Loch C
Nockenwellenrad
Antriebsrad-Halterung

Abb./Fig. 2-4-2 Nockenwellenrad/Zwischenzahnrad

2.4.2 Lageüberprüfung des Bandzug-Fühlstifts

1. Gerät ohne eingelegte Cassette auf Wiedergabe schalten.
2. Die Mitte des Bandzug-Fühlstifts muß in gerader Linie zur linken Sockelkante des Führungsstiftes liegen wie in Abb. 2-4-3 gezeigt.
3. Falls erforderlich Schraube ① lösen und Spannband-Halterung auf korrekte Lage des Bandzug-Fühlstiftes neu justieren.

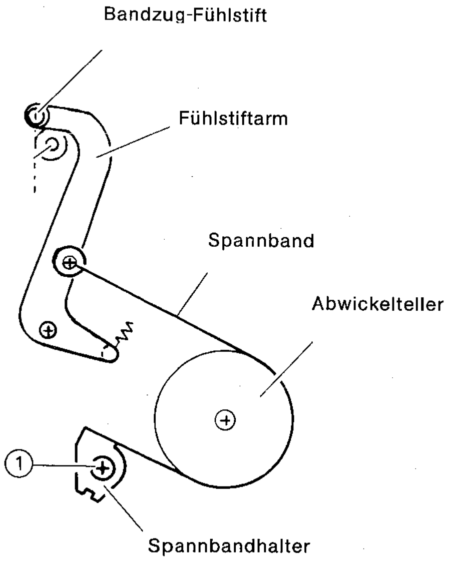


Abb./Fig. 2-4-3 Lageeinstellung des Bandzug-Fühlstifts

2.4.3 Überprüfung des Aufwickel-Bandzugs (Drehmoment)

1. Bei ausgebautem Cassettenschacht, Recorder auf Wiedergabe schalten.
2. Drehmomentmesser auf Aufwickelteller aufsetzen.
3. Druck auf den Drehmomentmesser reduzieren, so daß Zeiger und Skala mit gleicher Geschwindigkeit rotieren, und Wert ablesen. Der korrekte Wert liegt zwischen 60-100 g/cm.
4. Liegt der angezeigte Wert nicht innerhalb dieser Grenzen, muß die Kupplungsmechanik ausgetauscht werden.

2.4.4 Überprüfung des Bandzugs

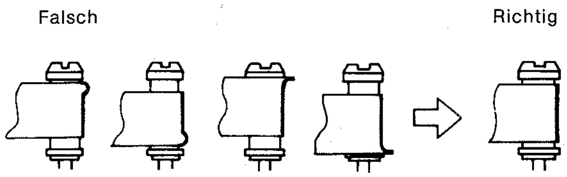
1. Bandzug-Cassetten-Lehre benutzen und Gerät auf Wiedergabe schalten.
2. Die Anzeige muß zwischen 11 und 19 liegen.
3. Liegt die Anzeige nicht innerhalb dieser Grenzen, Lage des Bandzugfühlers und Zustand der Feder zwischen Bandzugarm und dem Hauptchassis überprüfen.
4. Wenn nötig Spannband auswechseln (siehe Abschnitt 2.3.9).

2.4.5 Tests und Einstellungen am Bandlauf-System

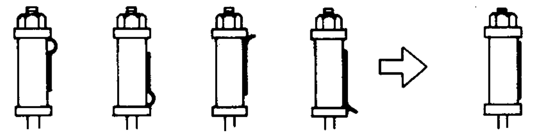
Das Bandlauf-System ist werksseitig auf das Genaueste abgeglichen und ein Nachstellen ist demzufolge normalerweise nicht erforderlich. Nachfolgende Überprüfungsarbeiten sind daher nur bei besonders hoher Beanspruchung oder nach Austausch bandführender oder dem Bandlauf-System zugehöriger Teile erforderlich.

* Überprüfung des Bandlaufs

1. E-120-Cassette einlegen und am Bandanfang und ende wie folgt prüfen:



(a) Führungsrolle



(b) Führungsstift

Abb./Fig. 2-4-5 Führungsrolle Führungsstift

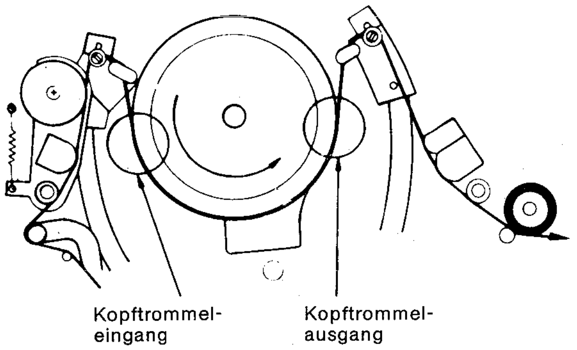


Abb./Fig. 2-4-4 Band am Kopftrommeleingang, -ausgang

1) Bei Wiedergabe, Bandlauf am Eingang zur und Ausgang von der Kopftrommel überprüfen. Das Band darf an der Führung nicht auf und ab laufen.

2) Bei erkennbaren Schwankungen nach unten oder oben, Höheneinstellung der Führungsrolle korrigieren.

3) Band im Wiedergabe-Betrieb an den Aufwickel- und Abwickelführungsrollen auf eventuelle Schlaufenbildung und Knicke kontrollieren.

4) Bei Feststellung solcher Fehler, Höheneinstellung des Bandführungsbolzens und Neigung des Audio/Synchronkopfes korrigieren.

2. Die 120-er Cassette am Bandende mit sichtbarem Bandsuchlauf Rückwärts (7-fach Geschwindigkeit) umspulen.

1) Band auf eventuelle Schlaufenbildung, Knicke oder Bandrutschen am Aufwickel-Bandführungsbolzen untersuchen.

2) Treten hierbei Veränderungen auf, muß die Andruckrolle untersucht werden.

3. Band-Austauschbarkeitsprüfung und Einstellung vornehmen (siehe Abschnitt 2.4.6).

* Führungsrolle-Höheneinstellung

1. Stellschraube am Sockel der Führungsrolle lockern.
2. Cassette einlegen und Gerät auf Wiedergabe schalten.
3. Schraubenzieher in den Kopf der Führungsrolle stecken und langsam und vorsichtig drehen bis das Band satt und ohne auf und ab in der Führungsrolle läuft.

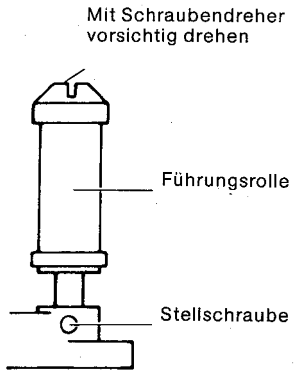


Abb./Fig. 2-4-6 Führungsrolle-Höheneinstellung

Hinweis:

1) Stellschraube nur so weit drehen, daß die Führungsrolle gedreht werden kann. Bei zu loser Stellschraube kann die Führungsrolle durch den Bandlauf versehentlich verstellt werden.

2) Führungsrolle vorsichtig drehen um eine Beschädigung des Bandes zu vermeiden.

* Höheneinstellung des Abwickel-Bandführungsbolzens

1. Cassette einlegen und Gerät auf Wiedergabe schalten.

2. Mit Schraubendreher so lange drehen, bis das Band glatt und ohne zu schlaufen an dem Bolzen entlang läuft.

* Audio/Synchronkopf

1. Cassette einlegen und Gerät auf Wiedergabe schalten.

2. Mit Schraube ① die Neigung des Kopfes so einstellen, daß das Band am Kopf anliegt und ohne Stoß läuft.

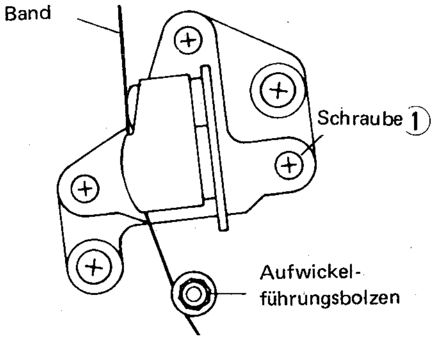


Abb. 2-4-7 Neigung des Audio/Synchronkopfes

2.4.6 Band-Austauschbarkeitsprüfung und Einstellung

Vor dem Einlegen der Test-Cassette (Abgleich-Cassette) normale Cassette einlegen und Bandlauf auf einwandfreies Funktionieren überprüfen.

* Vorbereitende Maßnahmen und Einstellungen

1. Oszilloskop an TP 106 (PB FM) der MAIN-Platte 0 2 anschließen. Externe Triggerung des Signals mit TP 411 (DRUM FF).

2. Test-Cassette MH-2 (Treppensignal) abspielen.

1) Spurlagenregler TRACKING auf max. FM-Ausgang einstellen. FM-Kurvenform am Schirm beobachten und max. Pegel (a) und die min. Pegel (b), (c) und (d) notieren. Die Verhältnisse zwischen den Pegeln müssen wie folgt aussehen:

$$\frac{b}{a} \geqq 0{,}7\ ;\ \frac{c}{a} \geqq 0{,}5 \text{ und } \frac{d}{a} \geqq 0{,}5$$

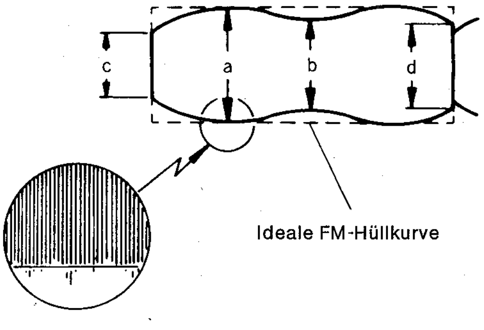


Abb./Fig. 2-4-8 FM-Hüllkurve (max. Ausgang)

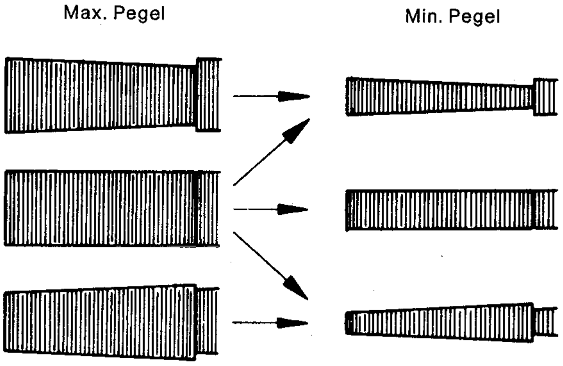


Abb./Fig. 2-4-9 Beispiele normaler Wellenformen

Hinweis:
Bei geriffelter oder gezahnter Wellenform, Wert an der am gleichmäßigsten geriffelten Stelle ablesen.

2) Spurlagenregler TRACKING auf minimum FM-Ausgang einstellen. Die Veränderung der Wellenform muß nahezu parallel zur Drehung des Spurlagenreglers erfolgen.

3) Zeigen obige Prüfungen normale Resultate, kann der nächste Schritt, die Einstellungen des Audio/Synchronkopfes ausgeführt werden. Werden jedoch Abweichungen festgestellt, sind folgende Arbeiten auszuführen:

3. Stellschrauben der Aufwickel- und Abwickel-Führungsrollen lösen (lockern). Sind die Führungsrollen leicht drehbar, die Stellschrauben wieder etwas anziehen.

4. Test-Cassette MH-2 (Treppensignal) abspielen.

5. Oszilloskop beobachten und Spurlagenregler TRACKING auf max. FM-Ausgang abgleichen.

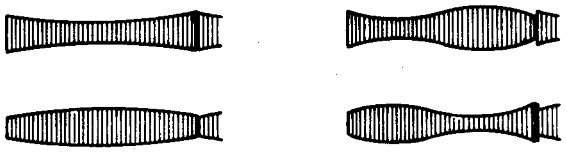


Abb./Fig. 2-4-10 Fehlerhafte Wellenformen

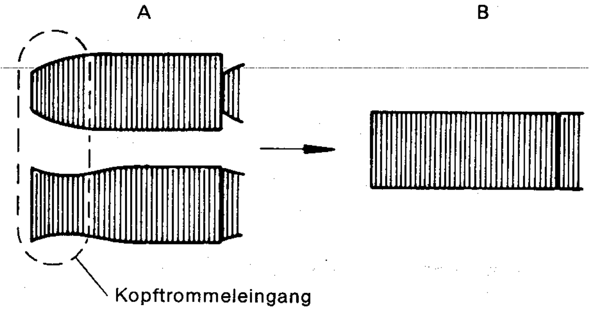


Abb./Fig. 2-4-11 Einstellung des Bandlaufs am Kopftrommeleingang

1) Siehe Abbildungen 2-4-10 und 2-4-11. Fig. A zeigt Beispiele fehlerhafter Wellenformen. Mit dem Schraubenzieher die Abwickelführungsrolle solange verstellen, bis die Kurvenform (Kopftrommeleinlauf) ihren Idealwert nach Abb. B erreicht und keine Einbrüche nach Abb. A aufweist.

2) Wie oben beschrieben wird nun die Aufwickelführungsrolle so eingestellt, daß die Kurvenform in Abb. C keine Einbrüche (Kopftrommelausgang) zeigt, sondern ihren Idealwert wie ihn Abb. D darstellt erreicht.

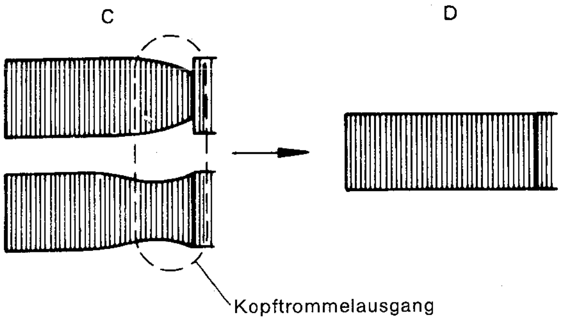


Abb./Fig. 2-4-12 Einstellung am Kopftrommelausgang

3) Neben der Einstellung darauf achten, daß es zu keinen Bandschlaufen und Auf- und Abgleiten des Bandes an den Abwickel- und Aufwickel-Bandführungsbolzen kommen darf. Hebt das Band von der Führung ab oder wird das Band am Abwickel-Bandführungsbolzen geknickt, muß die Höheneinstellung des Abwickel-Bandführungsbolzens korrigiert werden (siehe Abbschnitt 2.4.5)
Wird das Band am Aufwickel-Bandführungsbolzen geknickt. Einstellung durch Drehen der Schraube im Ton-Steuerkopf verändern (siehe Abschnitt 2.4.5).

6. FM-Wellenform beobachten und den Spurlagenregler TRACKING auf minimalen FM-Pegel abgleichen.

1) Ähnelt die Wellenform der Darstellung A, B, C oder D in Abb. 2-4-13, die Abwickel- und Aufwickel-Führungsrolle vorsichtig verstellen bis die Wellenform der Darstellung E, F oder G ähnelt.

Hinweis: Bei schwankender Wellenform auf minimale Schwankungen abgleichen.

2) FM-Ausgangspegel verändern und Feinjustage der Abwickel- und Aufwickel-Führungsrollen vornehmen.

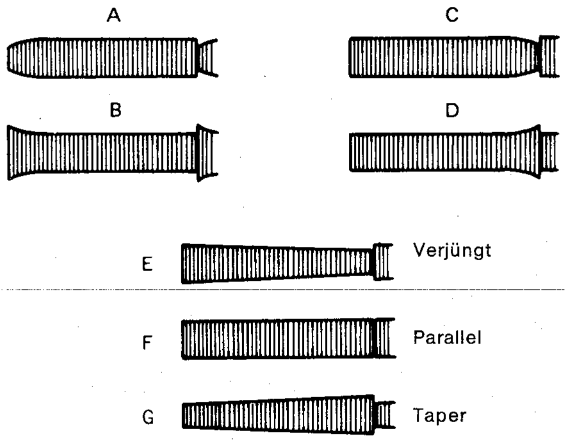


Abb./Fig. 2-4-13 Minimum FM-Wellenform /

* Audio/Synchronkopf Höhenjustage und Azimut-Einstellung.

Eine falsche Höheneinstellung des Ton-Steuerkopfes kann sich negativ auf den Geräuschspannungsabstand bei der Wiedergabe bespielter Cassetten auswirken.

1. Oszilloskop an den AUDIO OUT-Ausgang der MAIN-Platte 0 2 anschließen.

2. 7-kHz-Signal des Abgleichbandes MH-2 abspielen.

1) Mit Schraube ② und ③ auf maximum Ausgangspegel einstellen. Mit Schraube 3 den Azimut einstellen und darauf achten, daß es durch Verstellen der Schraube ② zu keinem Knick oder zu Falten des Bandes am Aufwickel-Bandführungsbolzen kommt.

2) Die Schrauben ① ② und ③ gefühlvoll verdrehen, bis der maximale Ausgangspegel erreicht wird.

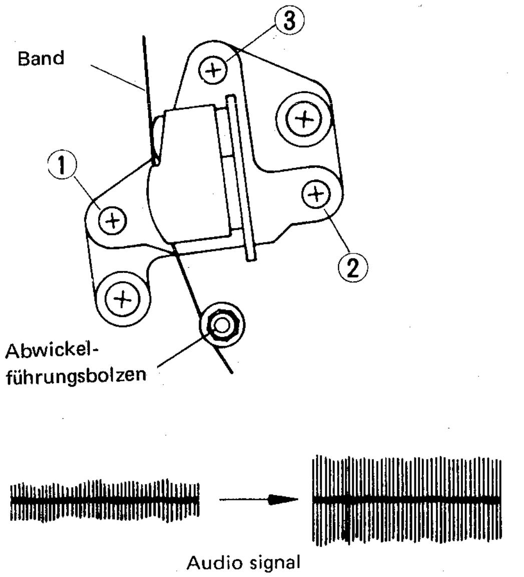


Abb./Fig 2-4-14 Einstellung des Audio-Synchronkopfes

Hinweis: a) Während der Einstellung sollte die Schraube ① nur um eine viertel Umdrehung verstellt werden, da sonst das Abgleichband beschädigt wird.
b) Nach Einstelung der Schraube ② den Azimut ausschließlich nur mit Schraube ③ nachjustieren.

3. Eventuell Abgleichschritte bis zur Optimierung wiederholen.

* Feststellen der Stellschraube

1. Nach erfolgter Überprüfung auf Bandknicke und einwandfreien Bandlauf, Gerät in die Stopp-Funktion umschalten und Stellschraube festziehen.
Hinweis: Stellschrauben vorsichtig festziehen.

2. Vorbereitende Maßnahmen und Einstellungen wiederholen.

* Einstellungen am Servosystem

1. Spurlage-Voreinstellung vornehmen (siehe Abschnitt 3.3.4)

*	Einstellung der Phasenlage des Audio-Synchronkopfes

1. Oszilloskop an TP 106 (PB FM) der MAIN-PLatte O 2 anschließen. Mit TP 411 (D.FF) extern triggern.

2. Treppensignal des Abgleichbandes MH-2 abspielen.

3. (-) Triggerpolarität einstellen und das CH-1 FM-Paket anschauen.

1) TRACKING-Knopf in Mittenstellung bringen.

2) Schrauben ④ und ⑤ lösen und den Audio/Synchronkopf in Richtung Capstanschaft verschieben.

3) Den Abgleichschlüssel über die Schraube ④ und in das Loch aufsetzen

4) Vorsichtig den Abgleichschlüssel soweit verdrehen, bis der erste Maximum-Ausgangspegel erreicht wird.

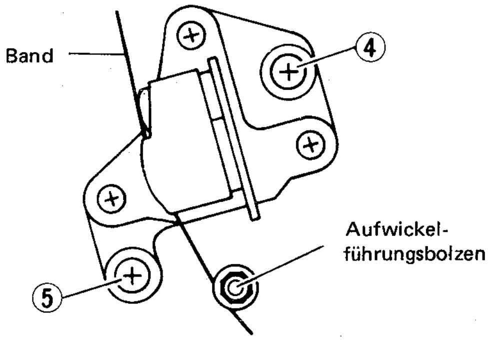


Abb./Fig 2-4-15 Audio-Synchronkopf Phaseneinstellung

*	Abschließende Tests

1. Oszilloskop extern mit TP 411 (D.FF) triggern und den Hauptkanal an TP 106 (PB FM) der MAIN-Platte O 2 anschließen.

1) Videosignal aufnehmen und wiedergeben. Die Wellenform sollte die gleiche Form aufweisen wie beim Abspielen des MH-2 Testbandes.

2. Servo-System (Abschnitt 3.3) und Video-System (Abschnitt 3.4) insgesamt überprüfen und ggf. feinjustieren.

3. Tonteil einstellen (Abschnitt 3.5).

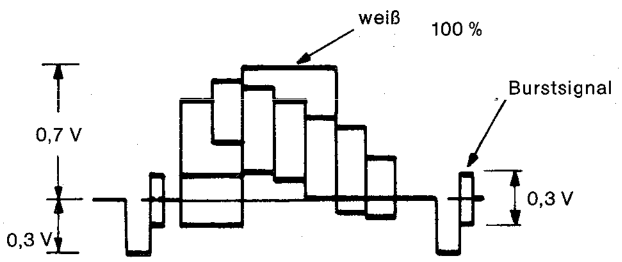
3. Elektrische Einstellungen

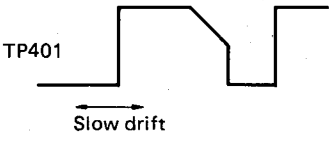
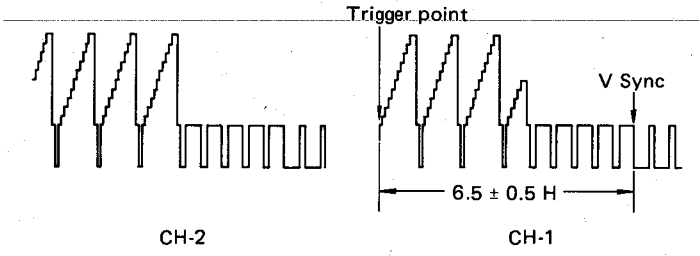
3.1 Vorbereitungen

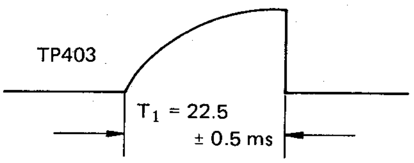
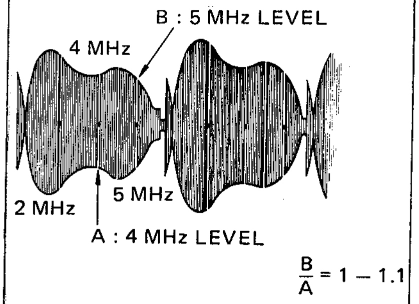
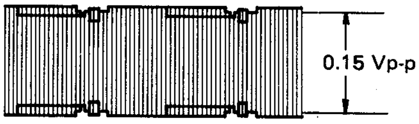
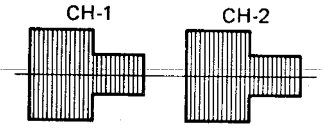
Die elektrischen Einstellungen sind nach dem Wechsel elektrischer, sowie einiger mechanischer Teile erforderlich. Es ist wichtig, daß diese Einstellungen erst nach Abschluß aller erforderlichen Reparaturen am Gerät durchgeführt werden. Außerdem sollten diese Einstellungen nicht verändert werden, bevor nicht die einwandfreie Gerätefunktion sichergestellt ist.

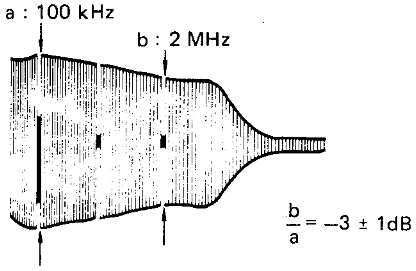
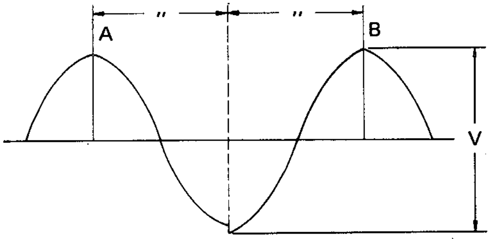
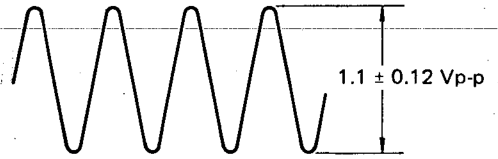
3.2 Erforderliche Meß-und Abgleichmittel

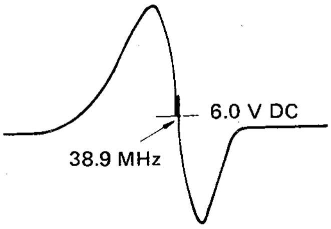
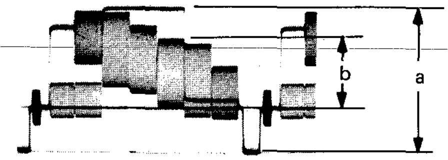
1. Farbfernsehgerät oder Monitor
2. Zweistrahloszilloskop, Bandbreite 10 MHz
3. Frequenzzähler
4. Tongenerator
5. Voltmeter (digital, analog)
6. Videowobbler
7. HF-ZF Wobbler
8. Farbbalkengenerator
9. Abgleichband MH-2



Einstellung	Betriebsart-Eing.-Signal	Meßpunkt	Einstellpunkt	Einstellschritte
3.3 NETZTEIL 0 2				
3.3.1 SWD 5 V	REC	TP 1 Netzteilpl.	R 6 (5 V ADJ)	5,33 V ± 0,1 V einstellen.
3.4 TIMER CONTROL 3 4				
3.4.1 Uhr	E-E	TP 404	C 409 Timerpl.	1. TP 401 und TP 402 miteinander verbinden. (der uP geht nun in den Testbetrieb) 2. C 407 kurzschließen (Reset des uP´s) 3. An TP 404 den zeitlichen Verlauf des Signals messen. Mit Trimmer-Kondensator C 409 auf 1,000 sec ± 1,2 usec einstellen. (Frequenzzähler)
3.5 SERVO-SCHALTUNG 0 2				
3.5.1 Kopftrommel-Freilauf	REC Farbbalken TP 421 und TP Vcc miteinander verbinden	TP 414 (DRUM FG) TP 401 (CTL PULSE)  Fig. 3-5-1	R 437 (DRUM DISC.)	1. Oszilloskop an TP 414. 2. Oszilloskop (-) mit TP 411 (DRUM FF)-Signal triggern. 3. Mit R 437 den REC CTL-Puls auf Stillstand bringen. (Ein langsames Durchlaufen des Vergleichssignales von weniger als 40 ms innerhalb von 5 Sek. ist zulässig.
3.5.2 Wiedergabe-Schaltpunkt	PB MH-2 Grautr.	TP 110 (VIDEO OUT)	R 429 (CH-1 SW PHASE)  Fig. 3-5-2	1. An TP 110 oder VIDEO OUT ein Oszilloskop anschließen. 2. MH-2 Grautreppe wiedergeben. 3. Externe Triggerung des Oszilloskops (-) mit dem Signal von TP 411. 4. Den Triggerpunkt mit R 427 auf 6,5 Zeilen vor dem Vertikalsynchronimpuls einstellen.

	Einstellung	Betriebsart Eing.-Signal	Meßpunkt	Einstellpunkt	Einstellschritte
3.5.3	Spurlagen voreinstell.	REC→ PB Farbbalken	TP 403 (TRACK)  Fig. 3-5-4	R 443 (PRESET)	1. Spurlageneinsteller R 202 in Rastposition bringen. 2. Farbbalkensignal aufnehmen und danach wiedergeben. 3. Oszilloskop an TP 403 4. Mit R 443 die Pulsdauer T_1 auf 22.5 ± 0,5 ms einstellen.
3.6	VIDEO-SCHALTUNG O 2				
3.6.1	Videokopf-Resonanz und Güte	PB Wobbelsign. Videogen.	TP 123 (CH 1) TP 126 (PB ENV) TP 124 (CH-1)  B : 5 MHz LEVEL 4 MHz 2 MHz 5 MHz A : 4 MHz LEVEL $\frac{B}{A}$ = 1 – 1.1 Fig. 3-6-2	C 101 (CH-1 f_o) R 116 (CH-1 Q) C 102 (CH-2 f_o) R 117 (CH-2 Q)	1. Das Gerät ohne eingelegte Cassette auf Wiedergabe schalten. 2. Oszilloskop an TP 126 anschließen. 3. Wobbelsignal an TP 123 einspeisen. Darauf achten, daß die Amplitude des Signals nicht zur Übermodulation an TP 126 führt. 4. Mit C 101 die 5,0 MHz-Marke auf max. Pegel einstellen. 5. Mit R 116 die 5,0 MHz-Amplitude auf das 2,5-fache der 1,0 MHz-Marke einstellen. 6. Mit C 102, R 117 den Abgleich für Kanal 2 nach vorstehendem Verfahren durchführen.
3.6.2	VXO	MH-2 Farbbalk. PB oder Farbbalk. aufnehmen und wiedergeben	TP 306 (f_{SC} 4,433 MHz)	R 317 (VXO 4,43 MHz)	1. Frequenzzähler an TP 306. 2. MH-2 Farbbalkensignal wiedergeben. 3. Mit R 317 auf 4,433619 MHz ± 50 Hz eistellen.
3.6.3	Aufnahme FM Pegel	REC Farbbalken	TP 122 (REC FM)  Fig. 3-6-3	R 148 (REC FM ADJ)	1. Farbbalkensignal aufnehmen. 2. Oszilloskop an TP 122 3. Mit R 148 den Pegel wie in Bild 3-6-3 angegeben auf 0,15 V_{SS} einstellen.
3.6.4	Aufnahme-Farbpegel	MH-2 Farbbalk. PB REC→ Pb Farbbalken	TP 304 (PB COL)  Fig. 3-6-4	R 311 (REC COL ADJ)	1. Oszilloskop an TP 304 2. Oszilloskop extern mit Triggerpolarität (-) an TP 411 triggern. 3. MH-2 Farbbalkensignal wiedergeben und sich den Wiedergabepegel "a" notieren. 4. Farbbalkensignal aufnehmen und wiedergeben. 5. Während dieser Aufnahme mit R 311 den Farbpegel auf 110 ± 5% gegenüber dem Wiedergabepegel "a" einstellen.

Einstellung		Betriebsart Eing.-Signal	Meßpunkt	Einstellpunkt	Einstellschritte
3.6.5	V PULSE Lage	REC → PB Gittermuster Standbild	Bildschirm	R 432 (V. LOCK)	1. Gittermustersignal aufnehmen und danach wiedergeben 2. In Standbildbetrieb gehen. 3. Mit R 432 das Bild auf minimales Zittern einstellen
3.6.6	Wiedergabe-FM-Entzerr.	REC→ Pb Farbbalken  Fig. 3-6-5	TP 110 (VIDEO OUT)	R 127 (RF EQ)	1. Oszilloskop an TP 110 und mit D-FF triggern. 2. Bildschärfeeinsteller in Rastposition bringen. 3. Aufgenommenes Wobbelsignal wiedergeben. 4. Mit R 127 den 2 MHz-Pegel auf 2,75-3,3 Skalenteile, gegenüber 5 Skalenteilen bei 100 kHz, einstellen.
3.6.7	SECAM DET	REC→Pb SECAM-Farbbal.  Set this point to center position between points "A" and "B". V = more than 5.5 Vp-p in REC V = 6.0 ± 0.5 Vp-p in PB Fig. 3-6-7	TP 310 (S DET ADJ)	L 308 (1/2 f_h TUNING) R 337 (S DET ADJ)	1. Oszilloskop an TP 310. 2. Mit L 308 den Umschaltpunkt genau auf die Mitte zwischen A und B einstellen. 3. Eigenaufnahme wiedergeben. 4. Mit R 337 auf 6,0 ± 0,5 Vss - Pegel einstellen.
3.7	AUDIO-SCHALTUNG O 2				
3.7.1	Audio Vormagnetisierung	REC	TP 31 (BIAS LEVEL) TP 32 (GND)	R 21 (BIAS LEVEL)	1. Zwischen TP 31 und TP 32 ein Digitalvoltmeter anschließen. 2. Ohne Eingangssignal den Recorder auf Aufnahme schalten. 3. Mit R 21 den Pegel auf 2,4± 0,2 mV einstellen
3.7.2	Audio-Wiedergabepegel	REC↪ Pb 1 kHz-Ton  Fig. 3-7-1	AUDIO OUT	R 5 (PB LEVEL)	1. Oszilloskop an AUDIO OUT. 2. Eigenaufnahme wiedergeben. 3. Mit R 5 auf einen Pegel von 1,1 ± 0,12 V_{SS} einstellen.

Einstellung	Betriebsart Eing.-Signal	Meßpunkt	Einstellpunkt	Einstellschritte
3.8 TUNER/ZF-SCHALTUNG 0 4				
3.8.1 LLD-Spule	E-E ZF-Wobbler (38,9 MHz)	TP 12 (V.DET.OUT)	T 3 (LLD)	1. Den Wobbler an Pin 9 des IC 1 (M 51316 BF). anschließen. 2. Eine Ausgangsspannung von 25 mVeff einstellen. Gleichspannungsnetzteil an TP 14 (AGC) so einstellen, daß an TP 12 (V.DET.OUT) ein Pegel von 1 Vss anliegt. 3. Mit T 3 (LLD) die 38,9 MHz-Marke auf Maximum abgleichen.
3.8.2 Eigentonfalle	E-E ZF-Wobbler (33,4 MHz)	TP 12 (V.DET.OUT)	T 1 (S.TRAP)	1. Den Wobbler und das Gleichspannungsnetzteil wie unter 3.8.1 beschrieben anschließen. 2. Mit T1 die 33,4 MHz-Marke auf Minimum stellen.
3.8.3 ZF-Spule	E-E ZF-Wobbler (38,9 MHz)	TP 12 (V.DET.OUT)	ZF-Spule im Tuner	1. Den Wobbler und das Gleichspannungsnetzteil wie unter 3.8.1 beschrieben anschließen. 2. Die 38,9 MHz-Marke auf Maximum einstellen.
3.8.4 AFC-Spule	E-E ZF-Wobbler (38,9 MHz)	PIN 24 IC 1 (M51316 BP)  Fig. 3-8-2	T 2 (AFC-COIL)	1. ZF-Wobbler auf 8,5 mVeff einstellen und AFC einschalten. 2. Oszilloskop an Pin 24 des IC 1 anschließen. 3. Gleichspannungsnetzteil an Pin 3 des IC 3 auf 2,2 V einstellen. 4. So einstellen, daß die S-Kurve noch nicht gesättigt erscheint. 5. So einstellen, daß die 38,9 MHz-Marke bei 6 V erscheint.
3.8.5 Nachbartonfalle	E-E ZF-Wobbler (32,4 MHz)	TP 12 (V.DET.OUT)	T 5 (ADJACENT TRAP)	1. 32,4 MHz mit 400 Hz-Modulation einspeisen. 2. Mit T 5 auf minimalen Pegel an TP 12 abgleichen.
3.8.6 HF-Regel-Spannung	E-E Farbbalken 75 dBuV Kanal 7	ZF-Ausgang vom Tuner	R 10 (AGC)	1.Farbbalkensignal auf Kanal 7 empfangen. 2. Zunächst mit R 10 auf maximalen Ausgangspegel, dann auf -10 dB einstellen.
3.8.7 Farbpegel	E-E Farbbalken 75 dBuV	TP 13 (VIDEO OUT)  b : magenta a : b = 1 : 0.44 Fig. 3-8-3	R 32 (COLOR LEVEL)	1. Farbbalkensignal auf Kanal 7 empfangen. 2. AFC einschalten und Farbpegel gemäß Abb.- 3-8-3 einstellen.

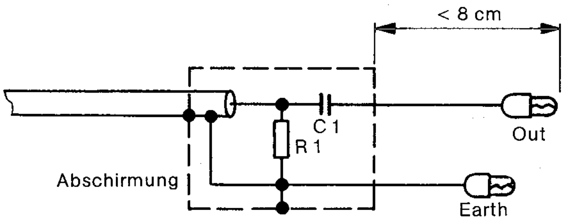
	Einstellung	Betriebsart Eing.-Signal	Meßpunkt	Einstellpunkt	Einstellschritte
3.8.8	Audiopegel	E-E Farbbalken 75 dBuV	TP 21 (AUDIO OUT)	R 40 (AUDIO LEVEL)	1. Farbbalkensignal auf Kanal 7 empfangen. 2. Mit R 40 an TP 21 den Pegel auf 0,44 Vss einstellen.

Tuner/ZF-Schaltung

Falls nicht anders angegeben, befinden sich alle Meß- und Einstellpunkte auf der Tuner/ZF-Platte (07).

Erforderliche Meßmittel:

1. Oszilloskop
2. ZF-Wobbelgenerator mit einstellbaren Marken
3. Gleichspannungsnetzteil
4. Tastkopf für Wobbler gemäß Abb. 3-10-1



C 1 : 1000 pF
R 1 : 75 Ω

Abb./Fig. 3-10-1 Tastkopf

General Mechanical adjustment

2.1.3 Disassembly

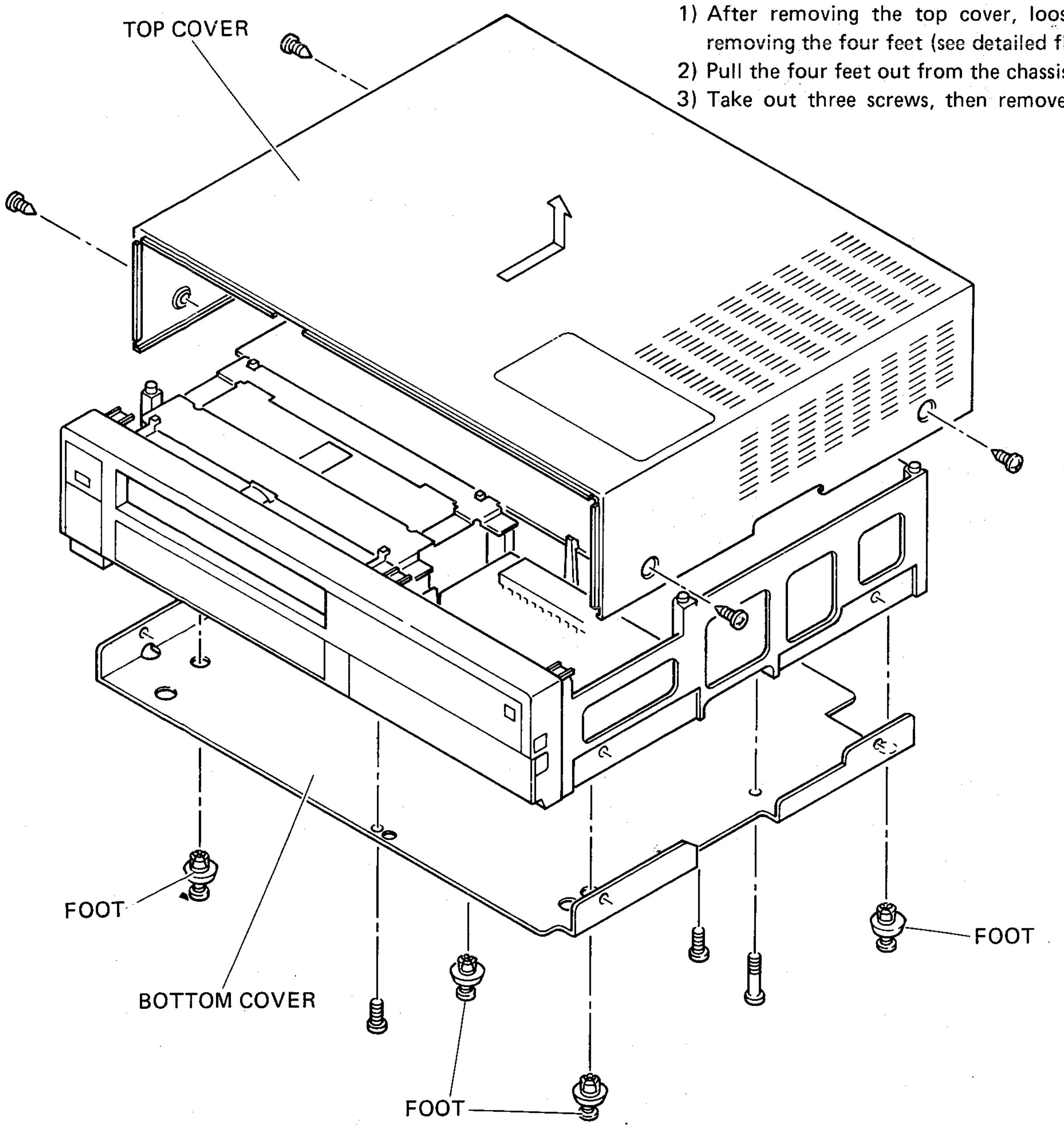
1. Top cover and bottom cover

– Top cover –

1) Take out four screws, then remove the top cover to the arrow direction.

– Bottom cover –

1) After removing the top cover, loosen four screws for removing the four feet (see detailed firures).
2) Pull the four feet out from the chassis.
3) Take out three screws, then remove the bottom cover.


TOP COVER
FOOT
BOTTOM COVER
FOOT
FOOT

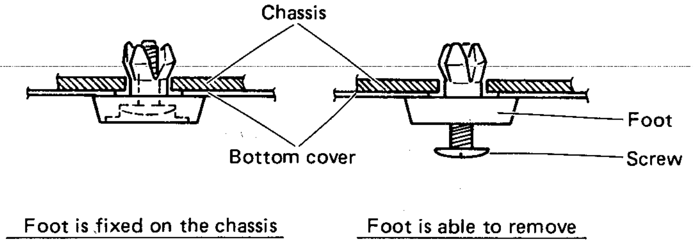

Chassis
Bottom cover
Foot
Screw
Foot is fixed on the chassis
Foot is able to remove

Fig. 2-1-1 Top cover/bottom cover

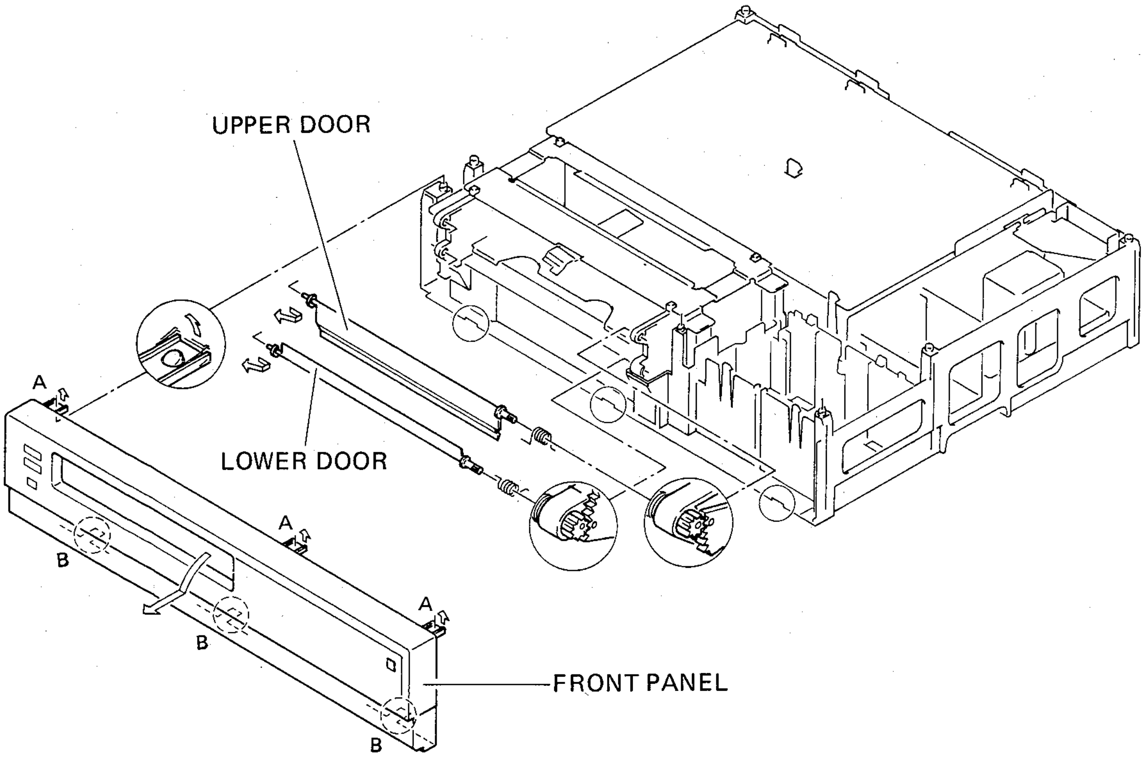
2. Front panel and cassette doors

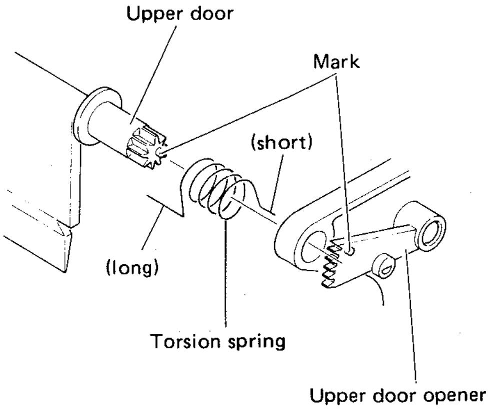
– Front panel –

1) After removing the top cover, bend three points A of the front panel upwards to disengage them from the chassis, then pull the front panel outwards.
2) Disengage three points B of the front panel from the chassis for removing the front panel.

– Cassette doors –

1) Move the lower door fully to the right, then disengage the left end of the lower door from the cassette housing.
2) Pull the lower door out to the left. Use care regarding the torsion spring.
3) Remove the upper door in the same manner as the lower door.





Notes:

When reassembling the doors, proceed as follows:

1) Locate the mark on the gear portion of the upper door.
2) Set the long straight part of the torsion spring toward the upper door.
3) Install the upper door so that the mark noted in Step 1) is aligned with the mark on the upper door opener of the cassette housing.
4) Install the lower door in the same manner as the upper door.

Fig. 2-1-2 Front panel/cassette doors

2.2 PERIODIC MAINTENANCE

The following procedures are recommended for maintaining optimum performance and reliability of this video cassette recorder.

2.2.1 Layout of maintenance parts

1. Top view

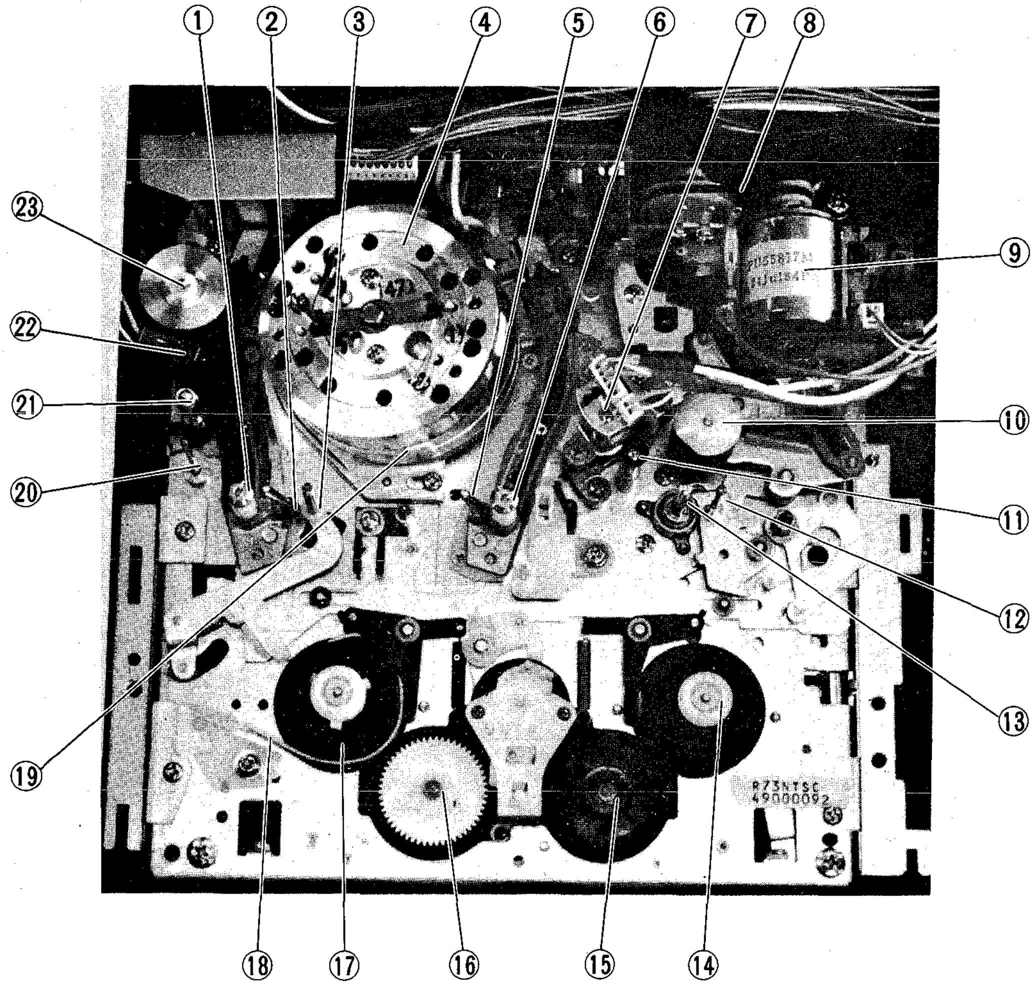

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Fig. 2-2-1 Top view

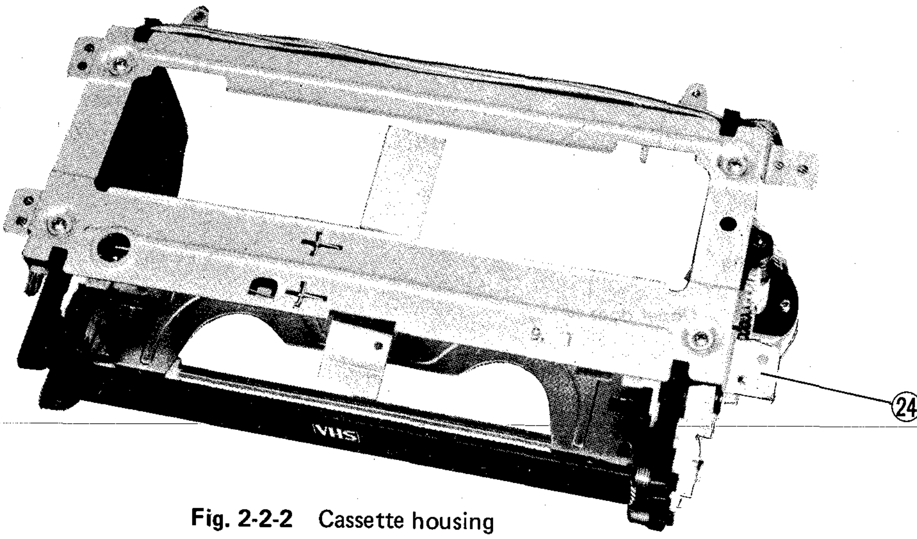


Fig. 2-2-2 Cassette housing

2. Bottom view

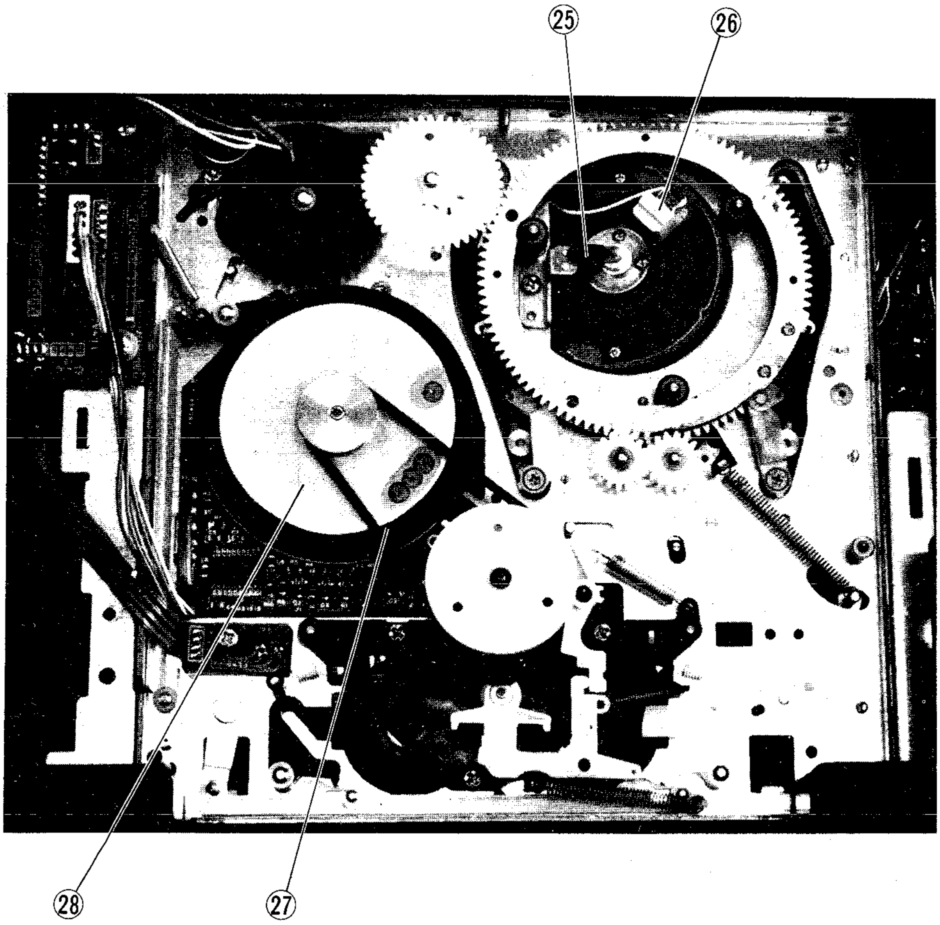


Fig. 2-2-3 Bottom view

1 SUP guide roller
2 SUP slant pole
3 Tension pole
4 Upper drum
5 T.U. slant pole
6 T.U. guide roller
7 Audio/Control head
8 Motor control belt
9 Mode control motor
10 Pinch roller
11 T.U. guide pole
12 Guide arm
13 Capstan
14 T.U. reel disk
15 T.U. clutch
16 SUP clutch
17 SUP reel disk
18 Tension band
19 Lower drum
20 SUP guide pin
21 SUP guide pole
22 Full erase head
23 Impedance roller
24 Cassette motor
25 Brush
26 Pick-up head
27 Reel belt
28 Capstan motor

T.U. : Take-up
SUP : Supply

2.3 MAIN ASSEMBLY REPLACEMENT

Remove the external covers and the circuit boards, as necessary, to allow replacement.

2.3.1 Cassette housing

- Removal of cassette housing

1. Take out screws ① and disengage two stoppers from MAIN board, then raise MAIN board upwards.
2. Disconnect connector CN1, coming from the MAIN board, from the CASS. HOUSING board.
3. Take out four screws ② and remove the earth plate.
4. Carefully lift the cassette housing upwards to remove it.

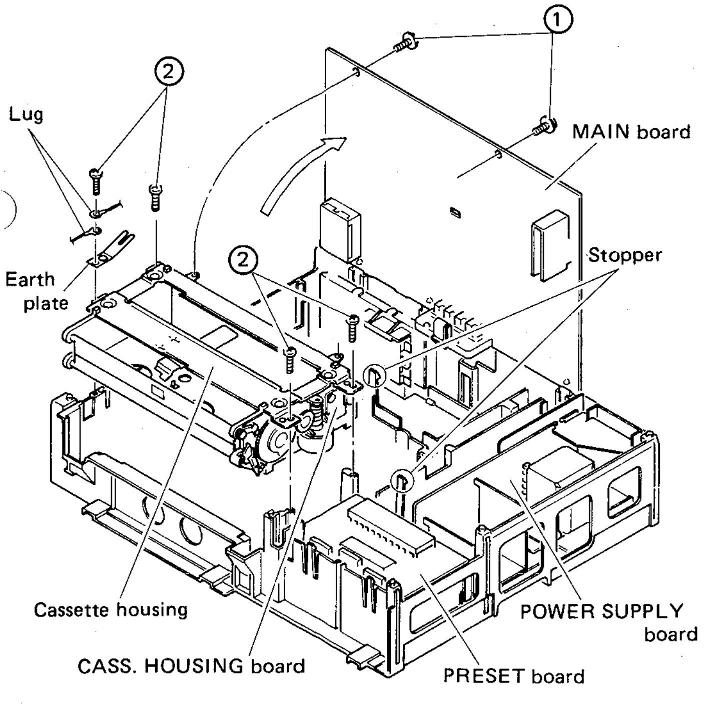


Fig. 2-3-1 Cassette housing removal

- How to operate the set without loading a tape cassette

  For service procedures that call for operation of the set without loading the tape around the head drum, extract the cassette housing from the interior of the set and position it as described below.

1. Set a sheet of insulated material (cardboard, plastic etc.) on the right side of chassis, above the PRESET and POWER SUPPLY boards.
2. Remove the cassette housing from the interior of the set and place it on the insulated sheeting, but do not disconnect the connector from the MAIN board.
3. Insert a cassette into the cassette housing. The housing mechanism functions to retract the cassette.

   Notes:

   2) To prevent alignment tape from miss-erasure, insert the cassette without safety tab into the cassette housing.
   3) Confirm that the cassette is not in tape end or tape start position.
4. Since the required sensors are contained within the housing, after the cassette has been retracted, the desired modes can then be obtained by using the operation switches.

2.3.2 Upper drum

1. Unsolder the twelve wires connecting the lower drum from the relay pins of the upper drum (perform quickly to avoid damaging the wires).

RELAY PIN COLOR	CHANNEL	INNER/OUTER
Brown	SP, CH-1	Brown/Green
Red	SP, CH-2	Red/White (Clear)

Table 2-3-1 Upper drum wiring

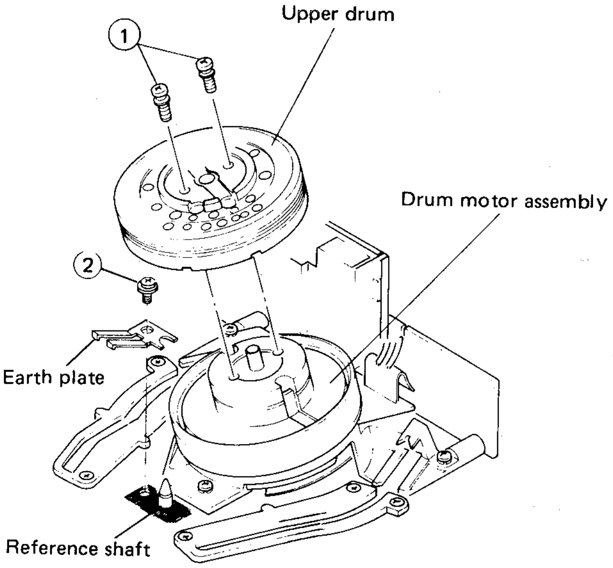


Fig. 2-3-2 Upper drum replacement

2. Take out two screws ① and remove the upper drum in the upward direction.
3. Use alcohol to clean the lower face of the new upper drum and the upper face of the lower drum. When handling and installing the new upper drum, avoid directly touching the head tips and use care not to scratch the drum.
4. Reassemble by reversing the above steps. When resoldering, observe the correct channels (refer to Table 2-3-1) and avoid overheating the wires.

5. Perform the upper drum eccentricity adjustment.
   1) Supply power and set for the Play mode without a cassette housing (refer to section 2.3.1). After completion of loading, disconnect from power.
   2) Take out screw ② and remove the earth plate as shown in Fig. 2-3-2.
   3) Set the micro-checker on the reference shaft as shown in Fig. 2-3-3. Use the accessory hex wrench (metric) to tighten the fixing screw.

Caution: The micro-checker is a test fixture for measuring eccentricity of the upper drum.
When using this fixture, observe the following precautions.

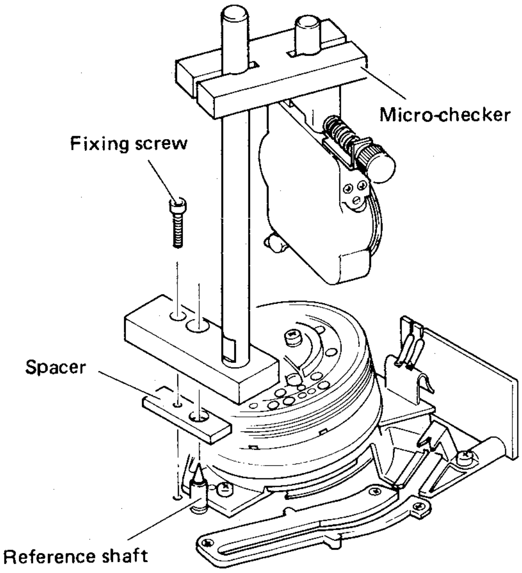


Fig. 2-3-3 Micro-checker mounting

- **As the instrument is extremely precise, use special care not to drop it or subject it to strong vibration.**
- Do not apply strong force to the test probe.
- The outer frame of the scale can be turned about 7 scale divisions. Do not turn it forcibly (force greater than 300 g-cm).
- **Use care that the fixture does not contact the video heads.**
- Before mounting, turn the fine adjust knob counter clockwise (to where the spring tension is no longer felt).
- **Do not apply power while the fixture are installed.**

4) Check and readjust the micro-checker position. The correct position is:
- The test probe contact point is 2 or 3 mm under the top of the upper drum.
- The test probe movement direction is toward the center portion of the upper drum.

5) Gradually turn the fine adjust knob clockwise so that the test probe contacts the upper drum. The dial indicator registers zero on the scale.
6) While using care not to apply lateral pressure to the upper drum, slowly turn the upper drum and read the deviations indicated by the micro-checker.

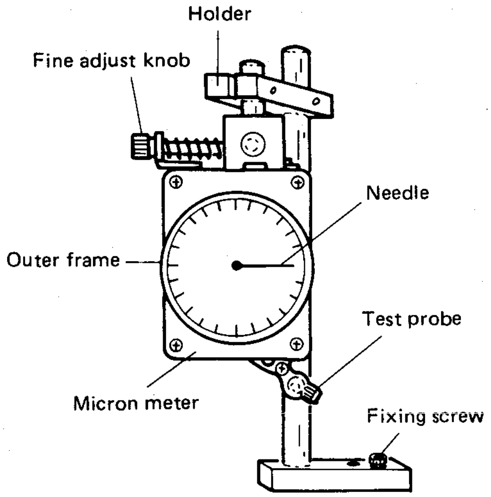


Fig. 2-3-4 Micro-checker

7) Check for needle deflection within 4 microns.
8) If deviation is greater than 4 microns, after turning the fine adjust knob counterclockwise to disengage the test probe from the upper drum, loosen two screws ① and carefully readjust the upper drum position, then retighten the two screws in a balanced manner. Repeat above steps 4) to 6).
9) After using, turn the fine adjust knob counterclockwise and remove the micro-checker.
10) After installing the earth plate, supply power and set for the Stop mode.

6. Perform the interchangeability adjustment (refer to section 2.4.6).

2.3.3 Full erase head

1. Disconnect the connector CN1 from the full erase head.
2. Take out screw ① and remove the full erase head from the erase head arm.
3. Replace the full erase head and reassemble by reversing the above steps.

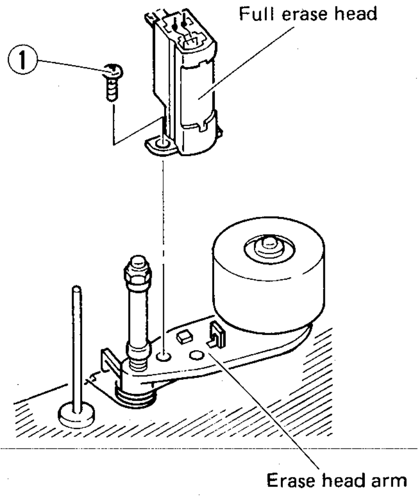


Fig. 2-3-5 F.E. head replacement

2.3.4 Audio/control head

1. Disconnect connectors CN1 and CN2 from the A/CTL HEAD board.
2. Take out screws ① and remove the audio/control head with the head base.

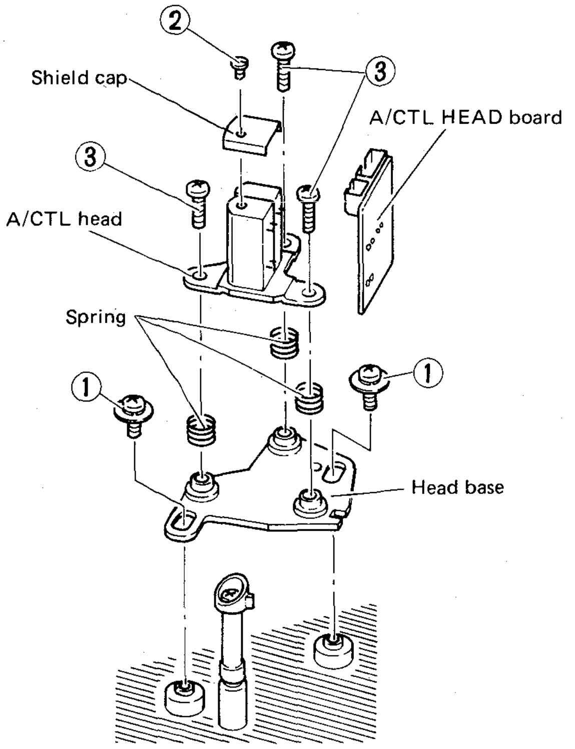

②
Shield cap
③
A/CTL HEAD board
③
A/CTL head
Spring
①
①
Head base

Fig. 2-3-6 A/CTL head replacement

3. Unsolder the six terminals coming from the heads and remove the A/CTL HEAD board.
4. Take out screw ② and remove the shield cap from the audio/control head.
5. Take out screws ③ to separate the audio/control head from the head base. Use care regarding springs.
6. Replace the audio/control head and reassemble by reversing the above steps.
   Before mounting on the main-deck, perform rough-adjustment of audio/control head height as shown in Fig. 2-3-7.

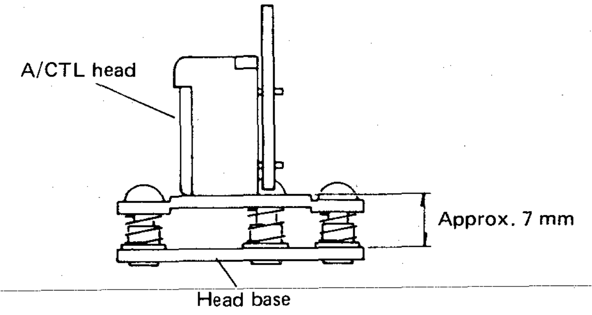

A/CTL head
Approx. 7 mm
Head base

Fig. 2-3-7 A/CTL head height

7. Perform the tape transport/interchangeability checks and adjustments (refer to sections 2.4.5 and 2.4.6).

2.3.5 Pinch roller

1. Take out slit washer ① and slit washer ②, and remove the pinch roller arm in the upward direction.
2. After cleaning, apply as mall a mount of grease to the pinch shaft.
3. Replace the pinch roller arm and reassemble by reversing the above steps. Avoid staining the pinch roller with grease.

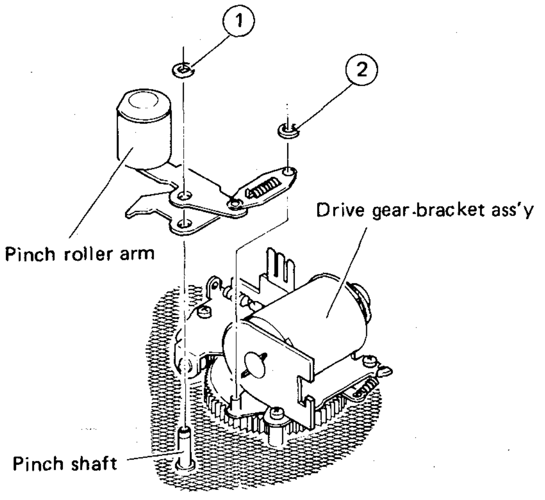

①
②
Drive gear-bracket ass'y
Pinch roller arm
Pinch shaft

Fig. 2-3-8 Pinch roller repalcement

2.3.6 Capstan motor

1. Take out slit washer ① and remove the guide arm with spring.
2. Disconnect connector CN3 from the DECK TERMINAL board.

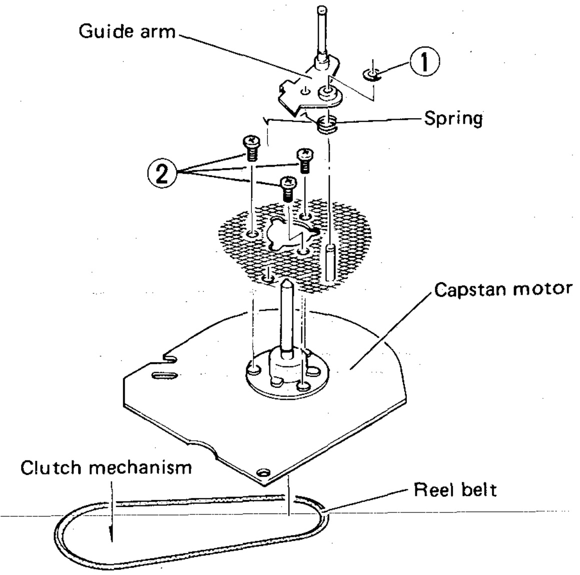

Guide arm
①
Spring
②
Capstan motor
Clutch mechanism
Reel belt

Fig. 2-3-9 Capatan motor replacement

3. Disengage the reel belt from the capstan motor and the pulley of the clutch mechanism assembly.
4. Take out three screws ② and remove the capstan motor in the downward direction. Use care regarding the motor brake.
5. Replace the capstan motor and reassemble by reversing the above steps.

2.3.7 Mode control motor

1. Take out screws ①, ② and ③ to free the main deck from the chassis.
2. Disengage the mode control belt from the motor pulley.
3. Disconnect connector CN1 from the MOTOR board. Take out screws ④ and ⑤, then remove the mode control motor.
4. Unsolder the mode control motor from the MOTOR board and replace.
5. Observe motor polarity (+ side upward) and reassemble by reversing the above steps.

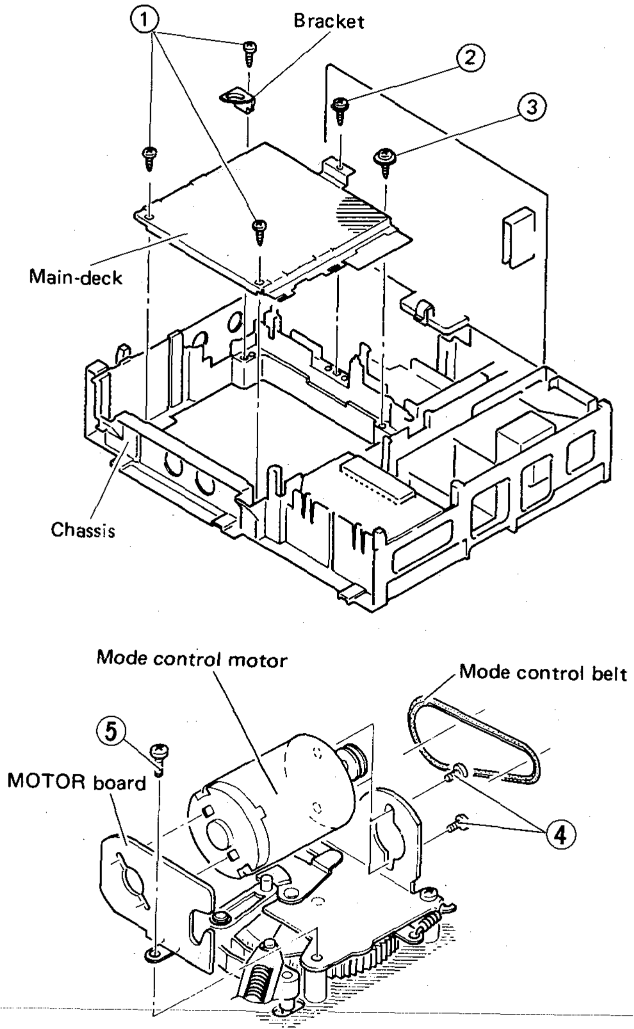


Fig. 2-3-10 Mode control motor removal

2.3.8 Cassette motor

1. Remove the cassette housing (refer to section 2.3.1).
2. Unsolder the two wires from the cassette motor.

DISTINCTION	WIRE COLOR
Thick boss	White
Thin boss	Gray

Table 2-3-2 Cassette motor wiring

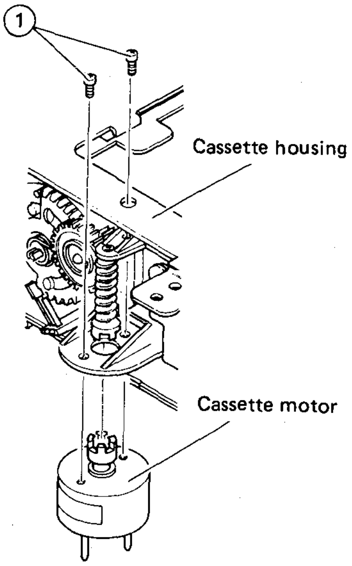


Fig. 2-3-11 Cassette motor replacement

3. Take out two screws ① and remove the cassette motor.
4. Replace the cassette motor and reassemble by reversing the above steps. Use care regarding the motor wire polarity (refer to Table 2-3-2).
5. Reinstall the cassette housing into its original position.

2.3.9 Reel disks

- Supply reel disk

1. Take out slit washer ① and remove the supply loading brake with spring.
2. Disengage the tension band holder from the tension arm and move the tension band to the side.
3. Take out slit washer ② and remove the supply reel disk upwards. Use care regarding the washers.
4. After cleaning the reel shaft with alcohol, lubricate it with one drop of sewing machine oil. Do not over lubricate.
5. Replace the supply reel disk and reassemble by reversing the above steps.
6. Perform the back tension check (refer to section 2.4.4).

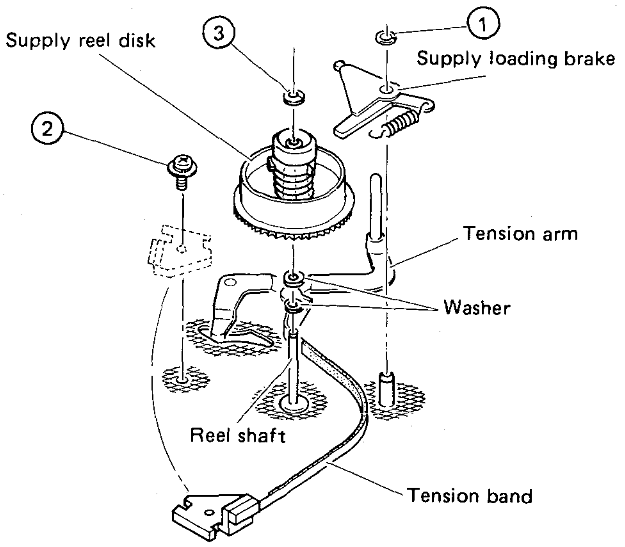

Supply reel disk
③
①
Supply loading brake
②
Tension arm
Washer
Reel shaft
Tension band

Fig. 2-3-12 Supply reel disk replacement

- Take-up reel disk

1. Take out slit washer ① and remove the take-up reel disk upwards while moving the take-up loading brake. Use care regarding the washers.
2. After cleaning the reel shaft with alcohol, lubricate it with one drop of sewing machine oil. Do not over lubricate.
3. Replace the take-up reel disk and reassemble by reversing the above steps.

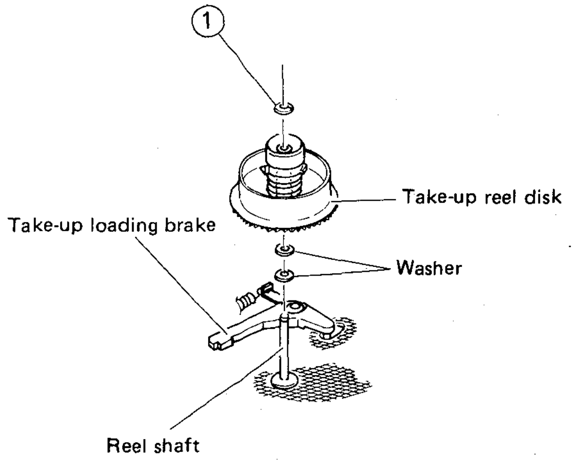

①
Take-up reel disk
Take-up loading brake
Washer
Reel shaft

Fig. 2-3-13 Take-up reel disk replacement

2.3.10 Clutch mechanism

- Take-up and Supply clutches

1. Remove the take-up reel disk (refer to section 2.3.9).
2. Take out slit washer ①, then remove the take-up clutch with shifting the take-up main brake. Use care regarding the washer under the clutch.
3. Clean the clutch shaft with alcohol, then lubricaate it with one drop of sewing machine oil. Do not over lubricate.
4. Replace the take-up clutch and reassemble by reversing the above steps.
5. In the same manner, remove the supply reel disk and replace the supply clutch.
6. Perform the take-up torque check (refer to section 2.4.3).

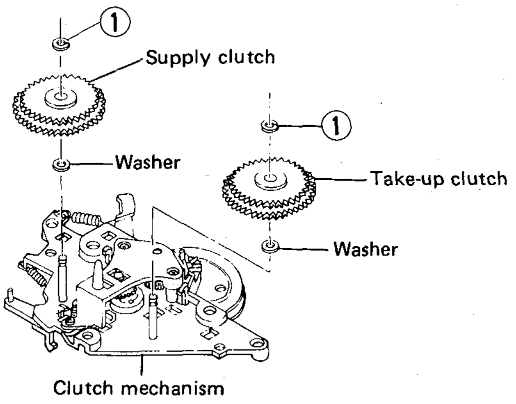

①
Supply clutch
①
Washer
Take-up clutch
Washer
Clutch mechanism

Fig. 2-3-14 Clutches replacement

- Clutch mechanism

1. Disengage the five springs from the clutch mechanism. These springs come from the supply loading brake, take-up loading brake, main brake slider, supply main brake and take-up main brake.
2. Disengage the reel belt from the pulley of the clutch mechanism.
3. Take out screw ① and remove the clutch mechanism.

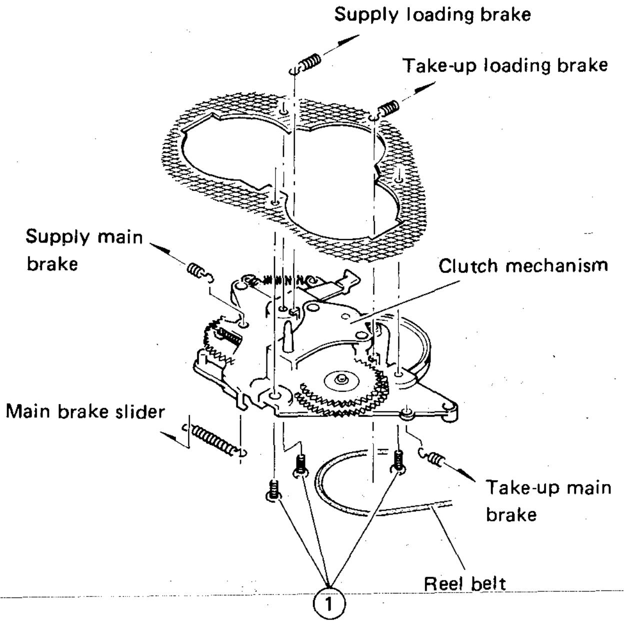

Supply loading brake
Take-up loading brake
Supply main brake
Clutch mechanism
Main brake slider
Take-up main brake
Reel belt
①

Fig. 2-3-15 Clutch mechanism replacement

4. Replace the clutch mechanism and reassemble by reversing the above steps.
5. Perform the take-up torque check (refer to section 2.4.3).

2.3.11 Brush

1. Take out screw ① and remove the brush, and clean the commutator with alcohol.
2. Replace and install the brush as before, check that the brush contacts the center of the commutator.

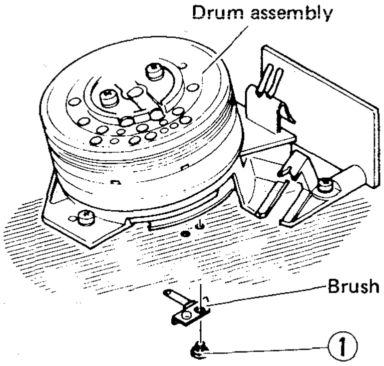


Fig. 2-3-16 Brush replacement

2.3.12 Tension band

1. Take out slit washer ① and remove the supply loading brake with spring.
2. Take out screw ② and disengage the tension band from the tension arm, then replace the tension band.

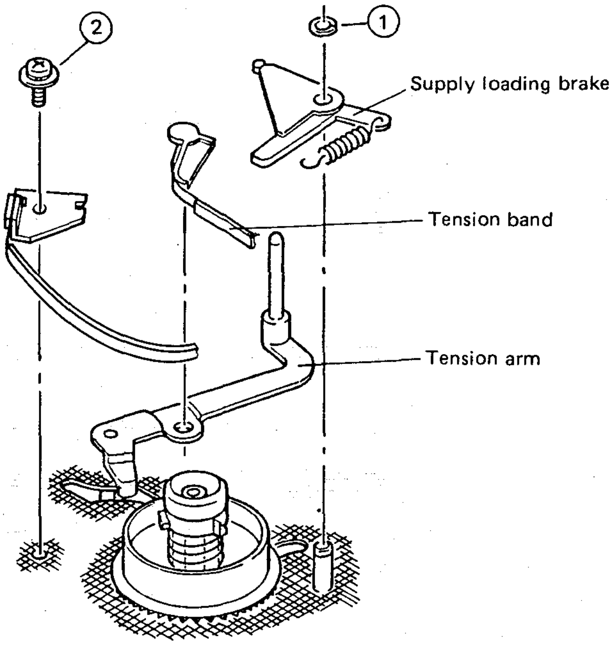


Fig. 2-3-17 Tension band replacement

3. Reassemble the tension band by reversing the above steps.
4. Perform the tension pole position check and the back tension check (refer to sections 2.4.2 and 2.4.4).

2.3.13 Pick-up head

1. Unsolder the two wires from the terminals of the pick up head.
2. Take out screw ① and remove the pick-up head.
3. Replace and reassemble the pick-up head by reversing the above steps. Use care regarding the wire polarity. Check that the pick-up head is toward the center position of the drum shaft.

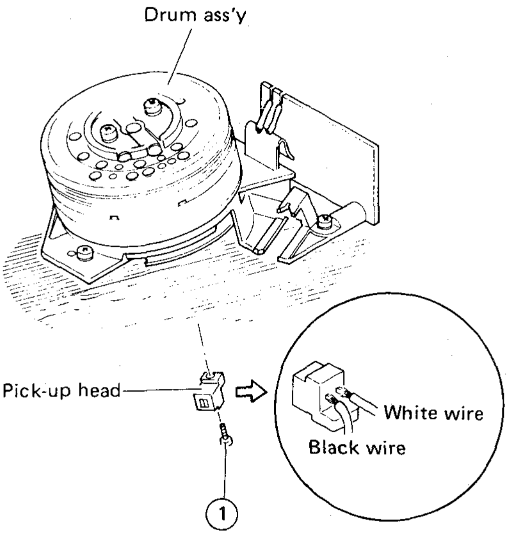


Fig. 2-3-18 Pick-up head replacement

2.4 CHECKS AND ADJUSTMENTS

2.4.1 Mechanism timing check

- Loading rings and loading gear (2)

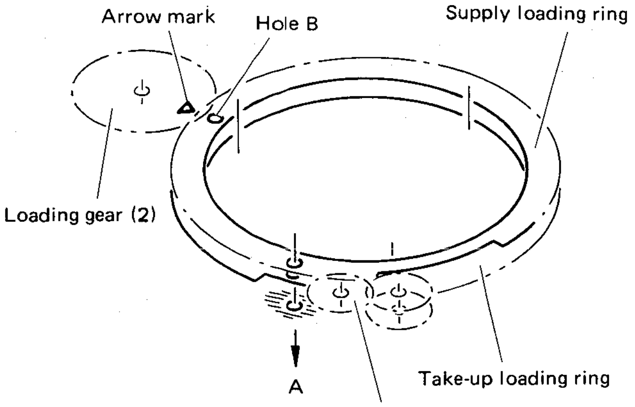


Fig. 2-4-1 Loading ring/loading gear (2)

1. Confirm that the two holes of supply and take-up loading rings are overlapped through the hole of the main-deck (arrow A in Figure). If a discrepancy is noted, after removing the connect gear (1), adjust the loading rings to obtain the correct position. Holes are overlapped in the Stop (FF/REW) mode position.
2. At the same time, confirm that the arrow mark of the loading gear (2) corresponds with hole B of the supply loading ring. If a discrepancy is noted, remove and re-install the loading gear (2) to obtain the correct position.

- Cam gear (drive gear bracket) and loading gear (1)

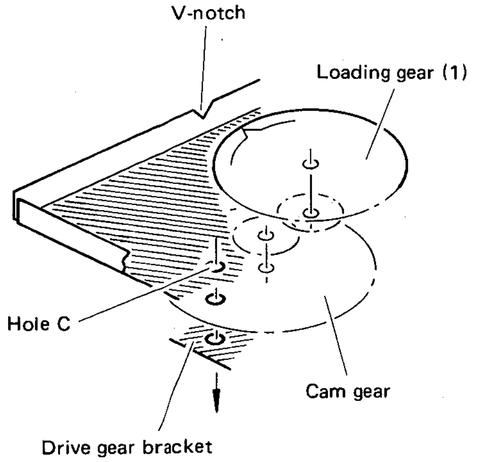


Fig. 2-4-2 Cam gear/loading gear (1)

1. When the two holes of cam gear and drive gear bracket are overlapped through the hole C of the main-deck (FF/REW mode position), confirm that the arrow indication of loading gear (1) is aligned with the V-notch of the main-deck. If a discrepancy is noted, remove and re-install the loading gear (1) to obtain the correct position.

2.4.2 Tension pole position check

1. Without loading a tape, set for the Play mode (refer to section 2.3.1).
2. Confirm that the center of the tension pole is positioned at the left side of the supply guide pin bushing as shown in Fig. 2-4-3.
3. If necessary, loosen screw ① and adjust the tension band holder to obtain the correct tension pole position.

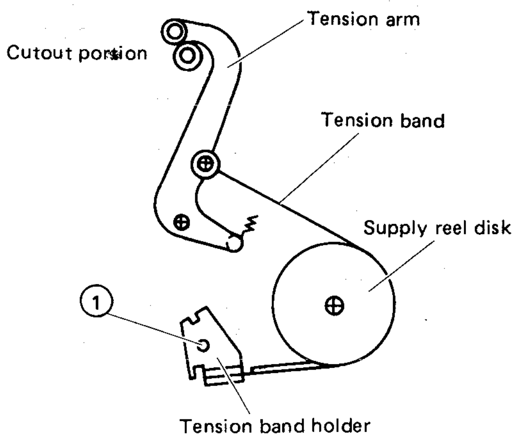


Fig. 2-4-3 Tension pole position

2.4.3 Take-up torque check

1. Set the Play (2H: SP) mode without loading a tape (refer to section 2.3.1).
2. Set the torque gauge on the take-up reel disk.
3. The torque gauge consists of upper and lower sections connected by a spring mechanism. When grasped by hand, then the grip on the gauge gradually relaxed, at a certain point, the upper indicator section will turn by the spring force to follow the rotating lower section. Read the valve at this point. The correct value is between 60 and 100 gf-cm.
4. If not the correct value, replace the take-up and supply clutches.

2.4.4 Back tension check

1. Use the back tension cassette gauge and set for the Play (2H: SP) mode.
2. Confirm that the indication is between 11 and 19.
3. If not the correct value, check the tension pole position (refer to section 2.4.2) and the condition of the spring between tension arm and main-deck and replace the tension band (refer to section 2.3.12).
4. If necessary, also replace the supply reel disk (refer to section 2.3.9).

2.4.5 Tape transport system checks and adjustments

The tape transport system has been precisely aligned at the factory and normally does not require readjustment. The following check is therefore necessary only in cases of severe usage or when replacing parts affecting the tape transport system.

- Tape transport checks

1. Use a 120-minute tape and check at the tape beginning and ending portion according to the following steps.

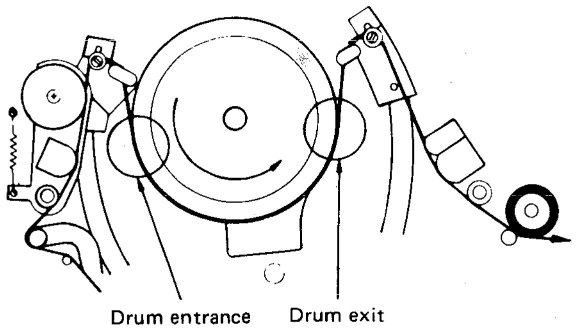
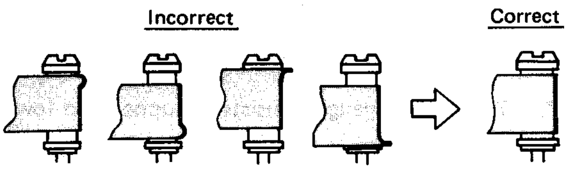
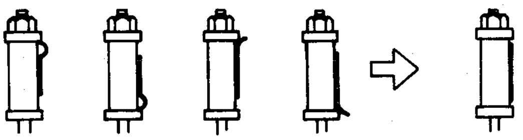


Fig. 2-4-4 Drum entrance/exit

1) During Play mode, observe tape at the entrance and exit portions of the drum lead.
Confirm that the tape slips neither upward nor downward with respect to the lead.



(a) Guide roller



(b) Guide pole

Fig. 2-4-5 Guide roller/guide pole

2) If defects are noted during the above check, perform the guide roller height adjustment.
3) During Play mode, observe the tape at the take-up and supply guide poles and guide rollers.
Confirm absence of curling, wrinkling, etc.
4) If defects are noted during the above check, perform the supply guide pole height and A/CTL head inclination adjustments.

2. At the ending portion of the recorded 120-minute tape, see for the Search Rev. (7 times speed) mode.
   1) Confirm absence of curling, wrinkling, slip, etc. at the take-up and guide pole.
   2) If defects are noted during the above checks, investigate the pinch roller.

3. Perform the interchangeability checks and adjustment (refer to section 2.4.6).

- Guide roller height adjustment

1. Slightly loosen setscrew under the guide roller of the pole base.
2. Use a cassette tape and set for the Play mode.
3. With a screwdriver, slightly turn the guide roller so that the tape travels smoothly in the drum lead without slipping upwards or downwards.

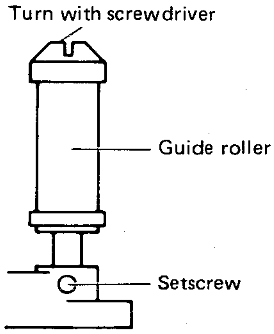


Fig. 2-4-6 Guide roller height adjustment

Notes:
1) Loosen the setscrew only enough to allow the guide roller to be turned.
If excessively loose, tape motion may turn the roller inadvertently.
2) Turn the roller carefully to avoid damage to the tape.

- Supply guide pole height adjustment

1. Use a cassette tape and set for the Play mode.
2. Use a metric nutdriver to turn the nut to align the tape lower edge with the upper face of the supply guide pole lower flange.

- Audio/control head inclination

1. Use a cassette tape and set for the Play mode.
2. Turn audio/control head screw ① and align the tape lower edge with the upper face of the take-up guide pole lower flange.

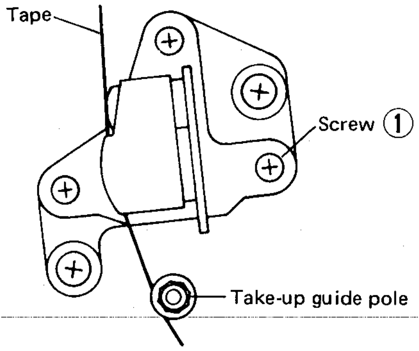


Fig. 2-4-7 Inclination of A/CTL head

Note: Take-up guide pole height is unable to adjust.

2.4.6 Interchangeability checks and adjustments

Before using an alignment tape, use a regular tape and confirm correct tape transport operation.

- Preliminary checks and adjustments

1. Connect an oscilloscope to TP106 (PB FM) of the MAIN board. Trigger the oscilloscope externally with the signal from TP411 (DRUM F.F.) of the MAIN board.
2. Play the alignment tape (stairstep signal) MH-2.

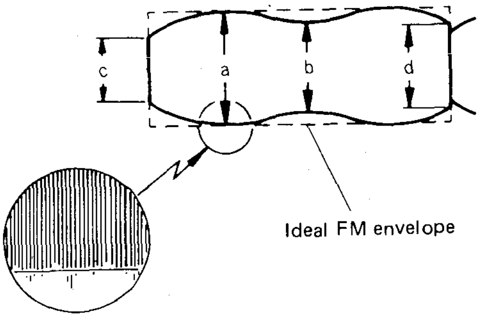


Fig. 2-4-8 FM waveform (max. output)

1) Turn the TRACKING knob to obtain the maximum FM output.
   Observe the FM waveform, read the maximum level (a) and the minimum levels (b), (c) and (d). Confirm that:

$$\frac{b}{a} \geqq 0.7, \frac{c}{a} \geqq 0.5 \text{ and } \frac{d}{a} \geqq 0.5$$

Note: If the waveform is serrated, read the value at the most uniform serrations.

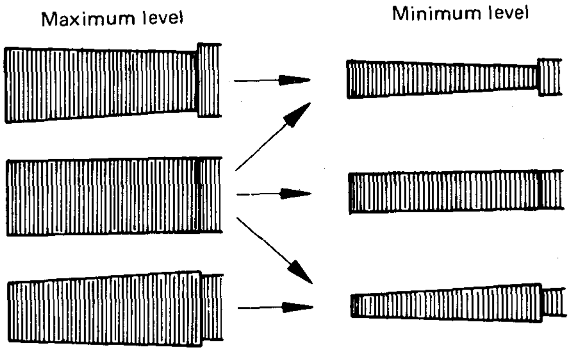


Fig. 2-4-9 Normal waveform examples

2) Turn the TRACKING knob to vary the FM output from maximum to minimum.
   Confirm that the waveform variation is nearly parallel.
3) If the above checks yield normal results, proceed to the audio/control head adjustments.
   If defects are noted, perform the following adjustments.

3. Loosen the setscrews of the supply and take-up guide rollers. If the guide rollers turn freely, slightly tighten the setscrews.
4. Play the alignment tape (stairstep signal) MH-2.
5. Observe oscilloscope display and adjust the TRACKING knob for maximum FM output.

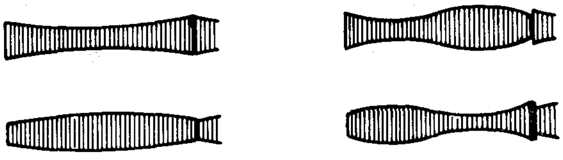


Fig. 2-4-10 Incorrect waveform examples

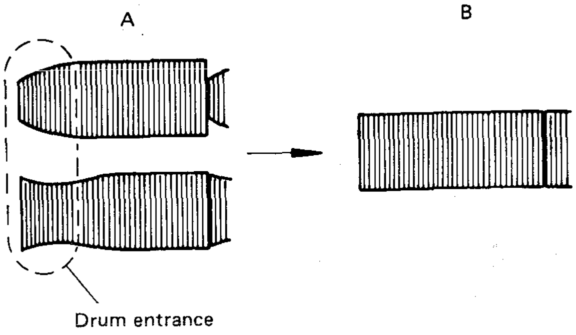


Fig. 2-4-11 Drum entrance adjustment

1) Refer to Figure. Examples of incorrect waveforms are shown by A.
   Use a screwdriver to adjust the supply guide roller so that the rising portion (drum entrance) of the waveform becomes flat as shown by B.
2) In the same manner as for the drum entrance, turn the take-up guide roller to adjust the falling portion (drum exit) of the FM waveform.
   Incorrect examples are shown by C in Fig. 2-4-12, while D indicates the correct adjustment.

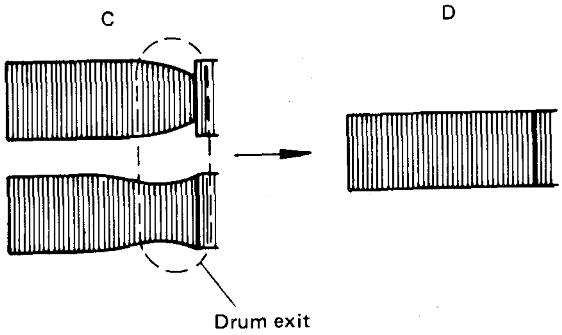


Fig. 2-4-12 Drum exit adjustment

3) In addition to observing the waveform, confirm absence of tape slippage or curling at the supply and take-up guide poles.
   If the tape separates from the guide or wrinkling occurs at the supply guide pole, adjust the supply guide pole height (refer to section 2.4.5).
   If at the take-up guide pole, adjust by turning the audio/control head screw (refer to section 2.4.5).

6. Observe the FM waveform and adjust the TRACKING knob for minimum FM output level.
   1) If the waveform becomes similar to A, B, C or D in Fig. 2-4-13, carefully adjust the supply and take-up guide rollers so that the waveform becomes similar to E, F or G.

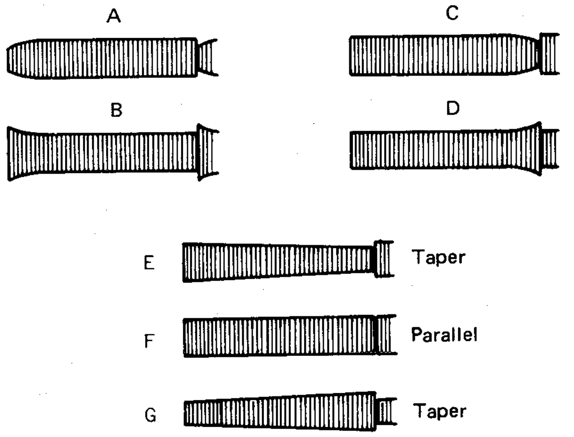


Fig. 2-4-13 Minimum FM waveform

Note: At this time, if the waveform fluctuates, adjust for minimum fluctuation.

   2) Vary the FM output level and perform fine adjustment of the supply and take-up guide rollers.

- Audio/control head height and azimuth adjustments

Incorrect audio/control head height can impair audio signal-to-noise ratio when playing back a pre-recorded tape.

1. Connect oscilloscope to the AUDIO OUT terminal of the MAIN board.
2. Play 7 kHz segment (stairstep signal) of the alignment tape MH-2.

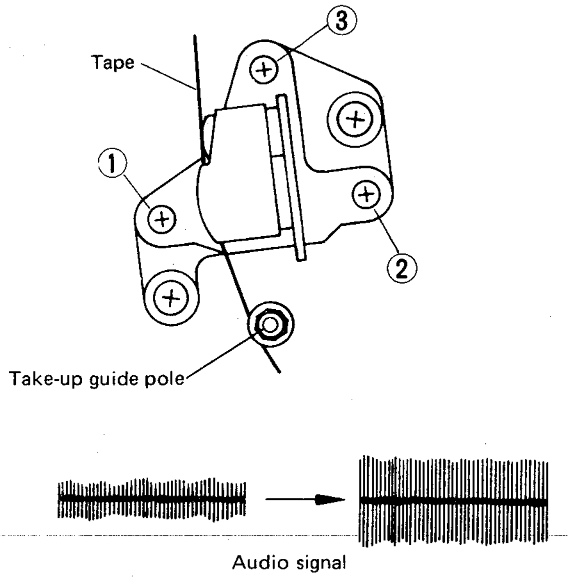


Fig. 2-4-14 Audio/Control head adjustment

   1) Turn screw ② and screw ③ to obtain maximum audio output. Adjust screw ② so that small tape wrinkles are not produced at the take-up guide pole, and azimuth with screw ③.
   2) Turn screws ①, ② and ③ by small and equal increments to adjust the audio/control head height for maximum audio output.
      With screw ① as reference, adjust inclination with screw ② and azimuth with screw ③.

Notes:

a) During adjustment, avoid turning reference screw ① by more than approximately 1/4 turn (this is also to avoid damaging the alignment tape).
b) After adjusting screw ②, be sure to adjust the azimuth with screw ③.

3. Repeat these adjustment steps to obtain maximum audio output with minimum level fluctuation.

- Setscrew tightening

1. After confirming absence of tape wrinkling and other transport irregularities, tighten the guide orller setscrews under the guide rollers while in the Stop mode.

   Note: Since the guide rollers are easily moved, use care when tightening.
2. Again perform the preliminary checks.

- Servo circuit adjustment

1. Perform tracking preset adjustment (refer to section 3.3.4).

- Control head phase adjustment

1. Connect an oscilloscope to TP106 (PB FM) of the MAIN board. Trigger the oscilloscope externally with the signal from TP411 (DRUM F.F.) of the MAIN board.
2. Play the alignment tape (stairstep signal) MH2.
3. Set the trigger to ⊖ slope and observe the CH-1 FM waveform.

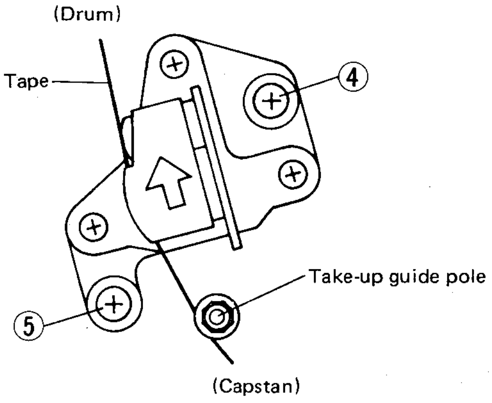


Fig. 2-4-15 Control head phase adjustment

1) Set the TRACKING knob to AUTO (center click position).
2) Loosen screws ④ and ⑤ . Shift the A/CTL head assembly fully in the direction of the capstan.
3) Cover screw ④ with the A/CTL head position tool and set the pin of the tool into the hole next to screw ④.
4) Gradually turn the tool clockwise and observe the FM waveform output. Set the A/CTL head assembly at the point of the first output peak.

- Final checks

1. Connect an oscilloscope to TP106 (PB FM) of the MAIN board. Synchronize the oscilloscope externally with the signal from TP411 (DRUM F.F.) of the MAIN board.
   1) Supply a video signal and perform recording, then play back. Confirm that the FM waveform also satisfies the specifications during playback of MH-2.
2. Perform overall checks and adjustments of the servo circuit (refer to section 3.3) and video circuit (refer to section 3.4).
3. Perform the audio circuit adjustment (refer to section 3.5).

SECTION 3
ELECTRICAL ADJUSTMENTS

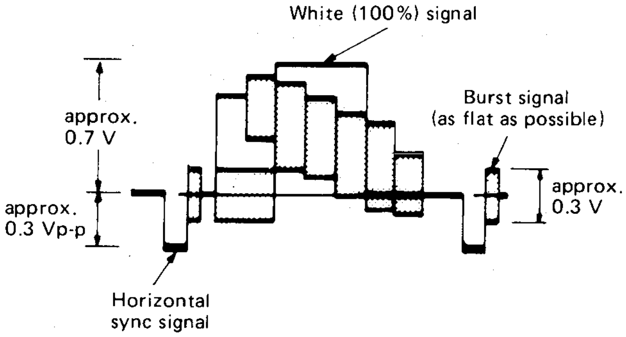
3.1 PREPARATION

Electrical adjustments are required after replacing circuit components and certain mechanical parts.

It is important to perform these adjustments only after all repairs and replacements have been completed. Also, do not attempt these adjustments unless the proper equipment is available.

3.2 REQUIRED TEST EQUIPMENT

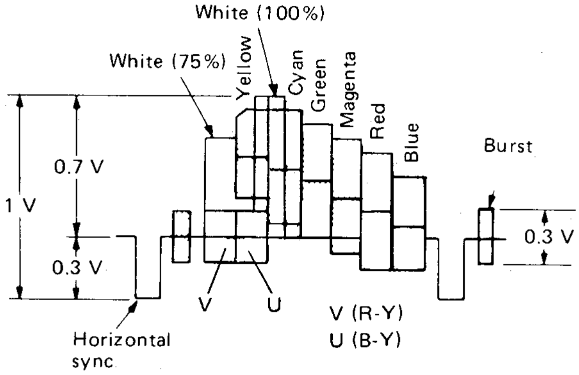
1. Colour television or monitor
2. Oscilloscope: Wide-band, dual-trace, triggered delayed sweep
3. Frequency counter
4. Audio oscillator
5. Audio voltmeter
6. Digital voltmeter
7. Signal generator: RF/IF sweep/marker
8. Signal generator : PAL colour bar, stairsteps


White (100%) signal
Burst signal
(as flat as possible)
approx.
0.7 V
approx.
0.3 Vp-p
approx.
0.3 V
Horizontal
sync signal

Colour-bar signal of pattern generator

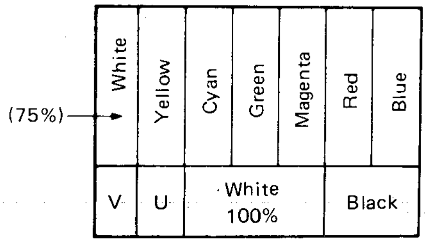
Fig. 3-2-1

9. Alignment tape : MHz
10. Recording cassette


White (100%)
White (75%)
Yellow
Cyan
Green
Magenta
Red
Blue
Burst
0.7 V
1 V
0.3 V
0.3 V
V
U
V (R-Y)
U (B-Y)
Horizontal
sync

Colour bar signal waveform

Fig. 3-2-2


(75%)
White
Yellow
Cyan
Green
Magenta
Red
Blue
V
U
White
100%
Black

Colour bar pattern

Fig. 3-2-3

3.2.1 Alignment Tape Contents

1. MH-2 contents

Segment	Playback Time	Video Signal	Audio Signal	Applications
1	10 minutes	Stairsteps	6 kHz	• Interchangeability checks and adjustments • Servo circuit checks and adjustments • Audio head azimuth adjustments
2	5 minutes	(none)	3 kHz	• Tape speed checks • Wow and flutter checks
3	10 minutes	Colour bars	1 kHz	• Video signal playback circuit checks and adjustments • Audio signal playback circuit checks and adjustments
4	3 minutes	RF sweep	(none)	• Video head resonance adjustments • Markers: 2.0, 4.0, 5.0 MHz

Table 3-2-1

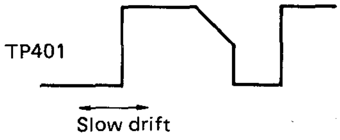
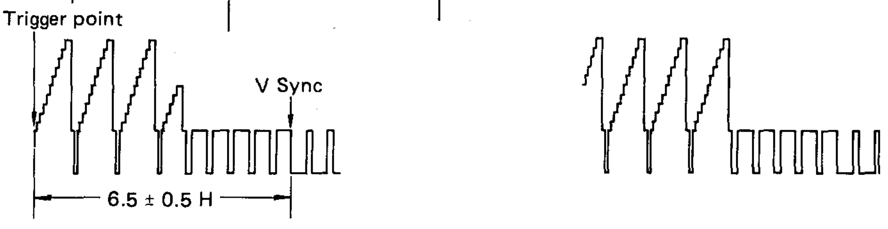
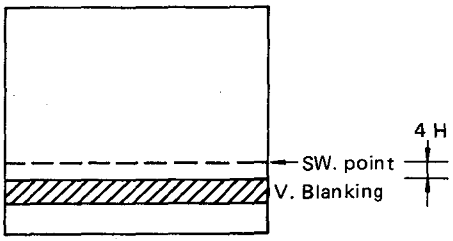
3.3 REGULATOR CIRCUIT (0 1 Power Supply Board)

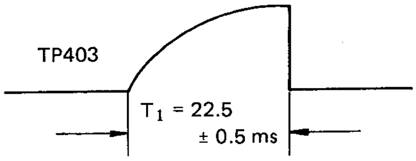
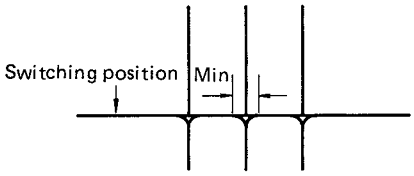
No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	SWD 5 V	TP1 (SWD 5 V) TP GND	R6 (5 V ADJ)	REC	1. Connect a digital voltmeter between TP1 and TP GND. 2. Adjust R6 for 5.33 ± 0.1 V.

3.4 TIMER CONTROL CLOCK (3 4 Timer board)

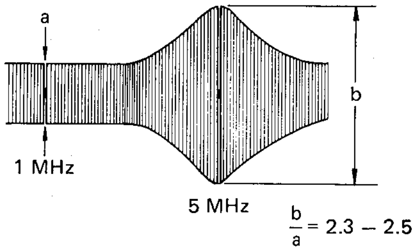
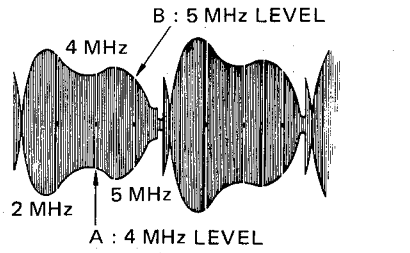
No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Clock	TP404	C409	•E-E	1. Short TP401 and TP402. (The microprocessor enters the Test mode.) 2. Short both ends of C407 (0.47/50) once. This resets the microprocessor. 3. Measure the period at TP404. Adjust trimmer capacitor C409 to obtain: 1.000000 sec ± 1.2 usec **Note:** After reset in the Test mode, all indicator segments light (except illuminated mode symbols).

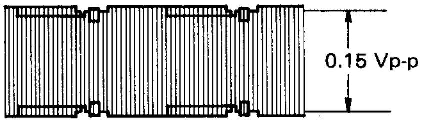
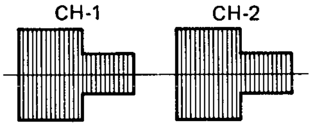
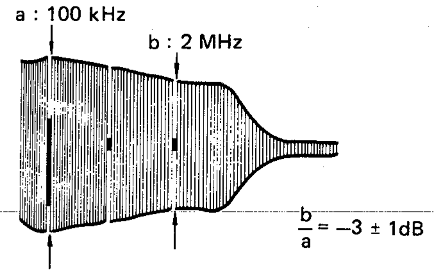
3.5 SERVO CIRCUIT (0 2 Main board)

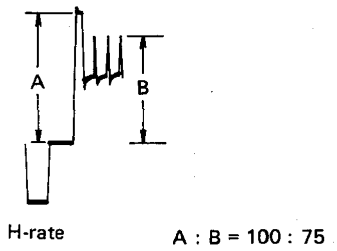
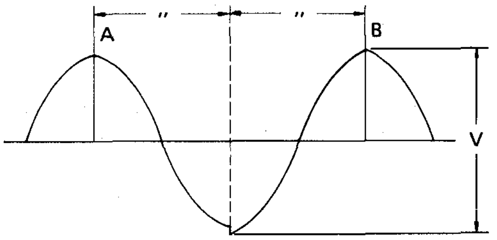
No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Drum free-run Method A	TP414 (DRUM FG)	R437 (DRUM DISCR)	•Colour bar or TV signal •REC •Short TP421 and TP Vcc	1. Connect a frequency counter to TP414. 2. Adjust R437 for 1500 Hz ± 4 Hz.
	Method B	TP401 (CTL PULSE)			1. Connect an oscilloscope to TP401. 2. Trigger the oscilloscope externally (–slope) with the signal from TP411 (Drum FF). 3. Adjust R437 to stabilize the REC CTL PULSE. (At this time, a drift at the rate of less than 40 ms in 5 seconds is acceptable).  Fig. 3-5-1
2	PB Switch point Method A	TP110 (VIDEO OUT) or VIDEO OUT	R429 (CH-1 SW PHASE) R427 (CH-2 SW PHASE)	•MH-2 Stairstep •PB	1. Connect an oscilloscope to VIDEO OUT or TP110. 2. Play the alignment tape (stairstep). 3. Trigger the oscilloscope externally (–slope) with the signal TP411. 4. Adjust R429 to position the trigger point 6.5 ± 0.5 H from V. sync. 5. Set oscilloscope sync slope to plus (+). In this condition, adjust R427 to obtain 6.5 H position.  CH-1 CH-2 Fig. 3-5-2
	Method B	TV screen			1. Play the alignment tape, and adjust R429 so that the switching point is 4H before vertical blanking. 2. Next adjust R427 so the switching points form a single line.  Fig. 3-5-3

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
3	Tracking preset Method A	TP403 (TRACK)	R443 (PRESET)	•Colour bar or TV signal •REC → PB	1. Set the TRACKING knob (R202) to the center click position. 2. Supply a colour bar signal, record then playback. 3. Connect an oscilloscope to TP403. 4. Adjust R443 so that the TP1 becomes 22.5 ± 0.5 msec.  Fig. 3-5-4
	Method B	TV screen			1. Supply a colour bar signal, record then playback. 2. Set TRACKING knob to the center click position. 3. Observe the TV screen and adjust R443 to minimize dihedral error.  Fig. 3-5-5
	Tracking sub NOTE: This adjustment is generally unnecessary except when replacing R202 (TRACKING) or R203 (Tracking sub).				1. Set the TRACKING knob (R202) to the center click position. 2. Adjust R203 of the 3 3 OPE board so that the total resistance of R202 and R203 becomes 125 k ohms.
4	Control head Phase				See section 2.4.6.

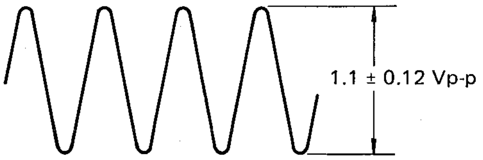
3.6 VIDEO CIRCUIT (0 2 Main board)

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Video Head Resonance, Q (Quality Factor) Method A	TP123 (CH-1 REC CURRENT) TP126 (PB ENV) TP124 (CH-2 REC CURRENT)	C101 (CH-1 fo) R116 (CH-1 Q) C102 (CH-2 fo) R117 (CH-2 Q)	•RF Sweep •PB	1. Set for the playback mode without a tape. (Refer to mechanical adjustment 2.3.1). 2. Connect the oscilloscope to TP126. 3. Apply the sweep signal from a video sweep generator to TP123. Then adjust the sweep gain so that the waveform does not distort at TP126. 4. At TP126 adjust C101 for maximum level at the 5.0 MHz marker position. 5. Adjust R116 so that the 5.0 MHz level becomes 2.5 times the 1.0 MHz.  **Fig. 3-6-1** 6. In the same manner, adjust C102 and R117 for CH-2.
	Method B	 	**Fig. 3-6-2**	•MH-2 RF Sweep •PB $\frac{B}{A} = 1 - 1.1$	1. Playback RF sweep segment of the MH-2 alignment tape. 2. Connect the oscilloscope to TP106. 3. Trigger the oscilloscope externally with the signal from TP411. 4. Use (–) trigger for CH-1 and (+) trigger for CH-2. 5. Turn R116 fully counterclockwise and R117 fully clockwise not to damp. 6. Adjust C101 to set the CH-1 resonance point to 5.0 MHz and C102 to set the CH-2 resonance point 5.0 MHz. 7. Adjust R116 so that the level of 5 MHz becomes greater than 4 MHz level by 1 dB. 8. In the same manner, adjust R117 for CH-2. 9. If the level of CH-1 and CH-2 differ, adjust the higher level channel to metch the lower by setting R116 and R117.
2	VXO	TP306 (fsc 4.433 MHz)	R317 (VXO 4.433MHz)	•MH-2 Colour bar •PB or •TV signal (colour) •REC → PB	1. Connect a frequency counter to TP306. 2. Playback the pre recorded tape or alignment tape. 3. Adjust R317 for 4.433619 MHz ± 50 Hz.

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
3	REC FM level	TP122 (REC FM)	R148 (REC FM ADJ)	•Colour bar •REC	1. Supply a colour bar input signal. 2. Connect an oscilloscope to TP122. 3. Adjust R148 so that the pedestal level of the vertical blanking component becomes 0.15 Vp-p.  Fig. 3-6-3
4	REC colour level	TP304 (PB COL)	R311 (REC COL ADJ)	•MH-2 colour bar •PB •Colour bar •REC → PB	1. Connect an oscilloscope to TP304. 2. Trigger the oscilloscope externally (— slope) with the signal from TP411. 3. Playback the alignment tape colour bar segment, then measure the colour level (CH-1). Make a note of this as level "a". 4. Supply a colour bar signal, record, then playback. 5. During recording, adjust R311 so that the colour level of CH-1 becomes 110 ± 5% of the level "a". **Note:** Playback the alignment tape, then playback a self-recorded tape and confirm the absence of colour level reversal between channels.  Fig. 3-6-4
5	V PULSE position	TV screen	R432 (V. LOCK)	•Colour bar •REC → PB → STILL	1. Supply a colour bar signal, record then playback. 2. Set for STILL playback mode. 3. Observe the picture display and adjust R432 for minimum vertical jitter.
6	P.B. Frequency response Method A	TP110 (VIDEO OUT)	R127 (RF EQ)	•Colour bar •REC → PB	1. Connect an oscilloscope to TP110. 2. Set the sharpness control to center click position. 3. Record and playback a video sweep (with sync) signal. 4. Adjust R127 so that the 2 MHz level become —3 ± 1 dB (63 — 79%) with reference to 100 kHz.  Fig. 3-6-5

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
	Method B			•PHILIPS pattern signal •REC → PB	1. Connect an oscilloscope to 35 pin of IC102. 2. Record and playback the Philips pattern signal. 3. Adjust R127 so that the crosshatch signal level at 35 pin becomes 75% as shown Fig. 3-6-6. 4. Confirm absence of flicker, black-white reversal in the playback picture. If necessary, readjust R116, R117 and R127 carefully.  Fig. 3-6-6
7	SECAM DET	TP310 (S DET ADJ)	L308 (1/2 fH TUNING) R337 (S DET ADJ)	•SECAM colour bar •E-E •REC → PB	1. Connect an oscilloscope to TP310. 2. Adjust L308 so that transition step becomes centered between "A" and "B" as shown in Fig. 3.6.7.  Set this point to center position between points "A" and "B". V = more than 5.5 Vp-p in REC V = 6.0 ± 0.5 Vp-p in PB Fig. 3-6-7 3. Record then playback. 4. Adjust R337 for 6.0 ± 0.5 Vp-p.

3.7 AUDIO CIRCUIT (02 Main board)

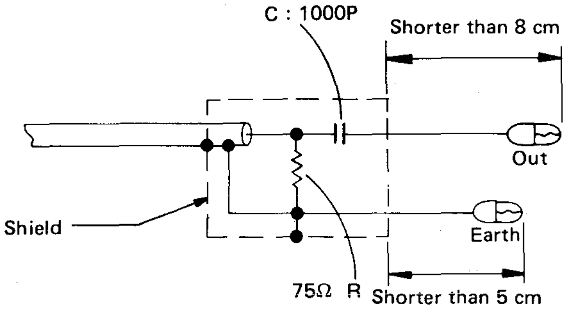
No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	Audio Bias level	TP31 (BIAS LEVEL) TP32 (GND)	R21 (BIAS LEVEL)	•REC	1. Connect a digital voltmeter between TP31 and TP32 (GND). 2. Set for the REC mode without signal. 3. Adjust R21 for 2.4 ± 0.2 mV.
2	Audio PB level	AUDIO OUT	R5 (PB LEVEL)	•Colour bar signal •Audio signal −20 dBs/1 kHz •REC → PB	1. Connect an oscilloscope to AUDIO OUT. 2. Record and playback a video signal and an audio signal. 3. Adjust R5 for −6 ± 1 dBs (1.1 ± 0.12 Vp-p) at AUDIO OUT.  Fig. 3-7-1

3.8 TUNER/IF CIRCUIT (04 TU/IF board)

Unless otherwise indicated, all test points and adjustments are located on the TUNER/IF board.

Equipment required

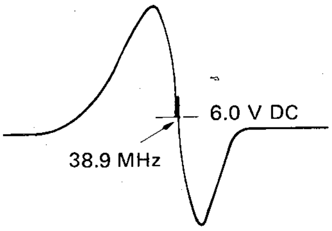
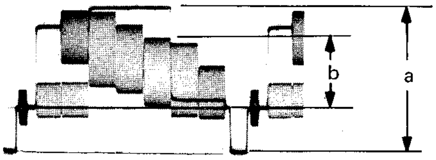
1. Oscilloscope
2. IF sweep signal generator with suitable markers (PIF, SIF, etc.)
3. DC power supplies – For power bias (12.0 V)
   – For IF AGC bias (approx. 5 V variable)
4. Sweeper probe (sweep signal supply cable) as shown below.



Sweeper probe

Fig. 3-8-1

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
1	LLD Coil	TP12 (V. DET. OUT)	T3 (LLD)	Sweep generator (38.9 MHz)	1. Connect the sweep generator out probe to pin 9 of IC1 (M51316BP). 2. Adjust the sweep gain so that the waveform does not distort as observed with the oscilloscope. (approx 25 mVrms) Connect a DC power supply to TP14 (AGC) Adjust AGC bias for 1 Vp-p TP12 (V. DET OUT). 3. Adjust T3 (LLD coil) so that video IF carrier 38.9 MHz marker becomes maximum level.
2	S. TRAP Coil	TP12 (V. DET OUT)	T1 (S. TRAP)	Sweep generator (33.4 MHz)	1. In the same manner as above item 1, connect the sweep generator and power supplies. 2. Adjust T1 (S. trap coil) so that sound IF carrier 33.4 MHz marker becomes minimize level.
3	IF Coil	TP12 (V. DET. OUT)	IF Coil (Inside the tuner unit.)	Sweep generator (38.15 MHz)	1. Connect the sweep generator out probe to test point inside the tuner unit. 2. Sweep level and power supplies are the same manner as item 1. 3. Adjust IF coil (inside the tuner unit) so that 38.15 MHz marker becomes maximum level.

No.	Item	Check Point	Adjustment Parts	Signal & Mode	Description
4	AFC Coil	Pin 24 of IC1 (M51316BP)	T2 (AFC COIL)	Sweep generator (38.9 MHz)	1. Set AFC SW to ON and sweep generator to 8.5 mVrms. 2. Connect the oscilloscope to pin 24 of IC1. 3. Connect a DC power supply to pin 3 of IC3 and adjust the DC power supply to obtain 2.2 V DC at pin 3. 4. Adjust the sweep gain so that the "S" curve appears as observed with the oscilloscope. Adjust AGC bias so that the "S" curve does not distort. 5. Adjust T2 (AFC) so that video IF carrier (38.9 MHz) becomes 6.0 V DC as shown in figure.  Fig. 3-8-2
5	Adjacent Trap	TP12 (V DET OUT)	T5 (ADJACENT TRAP)	IF sweep	1. Connect an IF sweep generator to the test point in the front end. 2. 32.4 MHz signal that is modulated at 400 Hz is supplied to test point in the front end. 3. Adjust T5 so that the waveform level at TP12 becomes minimum.
6	AGC	IF end (at the tuner unit)	R10 (AGC)	Colour bar TV channel signal generator	1. Supply a colour bar signal of VHF channel 7 from a TV channel signal generator and select the channel corresponding to the generator. 2. Adjust R10 so that IF end level of the tuner unit becomes maximum. 3. Readjust R10 so that the level becomes −10 dB with reference to the previous measured level.
7	Color Level	TP13 (VIDEO OUT)	R32 (COLOR LEVEL)	Colour bar TV channel signal generator	1. Supply a colour bar signal of VHF channel 7 from a TV channel signal generator and select the channel corresponding to the generator. 2. With AFC SW ON, adjust R32 to satisfy the figure at TP13.  b : magenta a : b = 1 : 0.44 Fig. 3-8-3
8	AUDIO Level	TP21 (AUDIO OUT)	R40 (AUDIO LEVEL)	Colour bar TV channel signal generator	1. Supply a video signal and 1 kHz audio RF signal of VHF channel 7 from a TV channel signal generator and select the channel corresponding to the generator. 2. Adjust R40 for −14 dBs (0.44 Vp-p) at TP21.

KUNDENDIENST
ITT Graetz
SERVICE

MANUAL

Schaltbilder – Lagepläne

Schematic Diagrams – Circuit Boards

Teil 1 / Part 1

VR
119-1
1985

V450

VIDEORECORDER 3906, 3916
TELERECORDER 4906, 4916

VHS
TELERECORDER 4906
Graetz
88:88

VHS
88:88
ITT

Dieses Manual gilt in Verbindung mit folgenden Manualen:

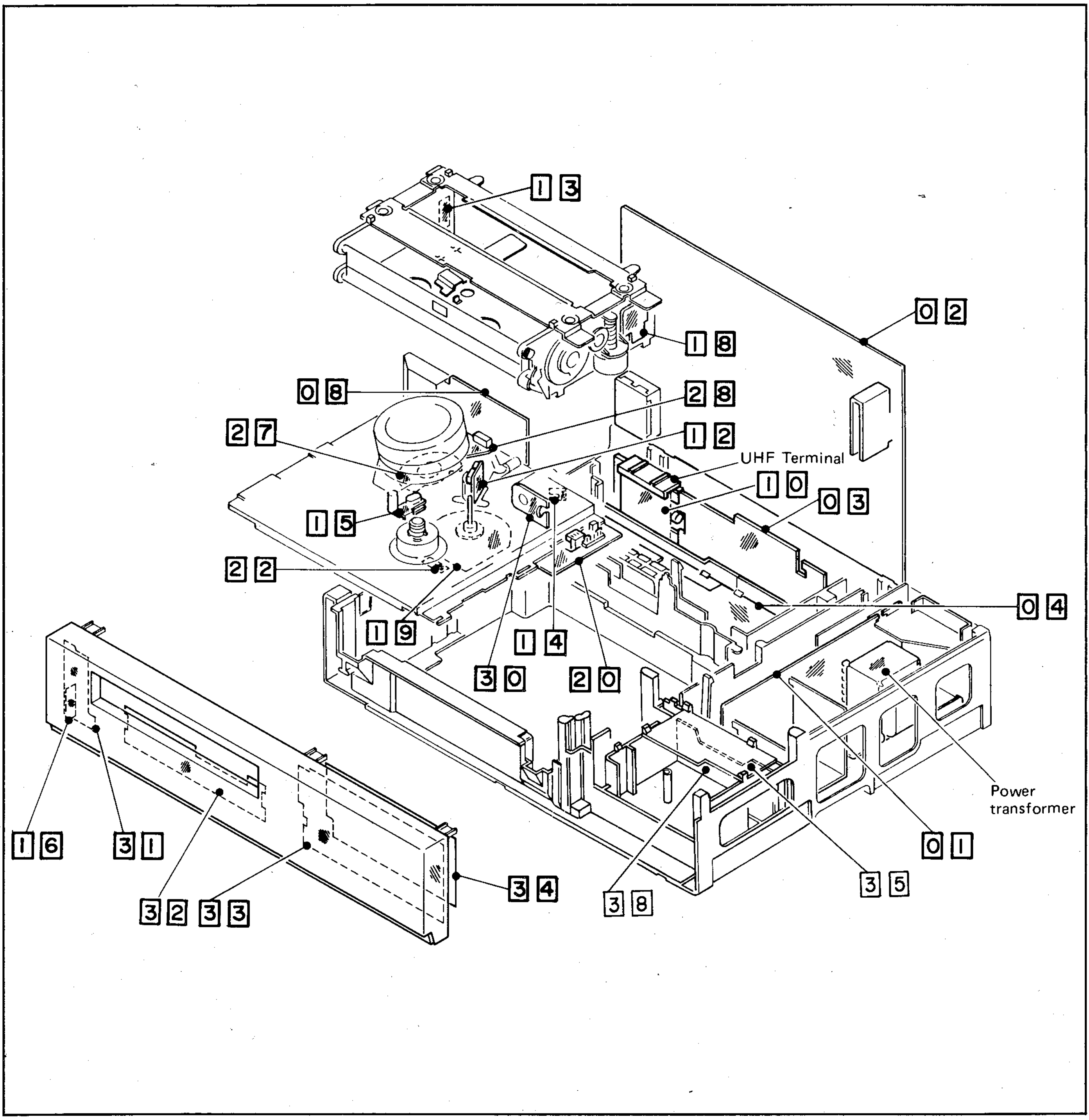
VR 119-1	Schaltbilder – Lagepläne Bestell-Nr. 6611 8216
VR 119-2	Einstellanweisung der Mechanik und Elektronik Bestell-Nr. 6611 8217
VR 119-3	Ersatzteile-Listen Bestell-Nr. 6611 8218

This manual is to be used in conjunction with the following Service Manuals:

VR 119-1	Schematic Diagrams – Circuit Boards Part. No. 6611 8216
VR 119-2	Mechanical and Electronic Adjustments Part. No. 6611 8217
VR 119-3	Spare Parts Lists Part. No. 6611 8218

Bei Reparaturen gültige Sicherheitsvorschriften beachten!

Baugruppen-Lageplan
Circuit-Boards Location



13
02
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08
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27
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UHF Terminal
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Power transformer
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Technische Daten

Systemdaten

Format:	VHS-Pal-Standard
Fernsehnorm:	CCIR-625 Zeilen-Pal
Bandbreite:	12,65 mm
Aufzeichnungsdauer:	max. 4 Std. mit einer E-240er Cassette

Anschlußdaten

Netzanschluß:	220 V∼, 50/60 Hz
Leistungsaufnahme:	30 Watt

Video

Eingang:	0,5 V_{SS}...2,0 V_{SS}/75 Ohm unsymmetrisch
Ausgang:	1,0 V_{SS}/75 Ohm unsymmetrisch
Signal/Rauschverhältnis:	43 dB (Bildschärfe-Einsteller in Mittelstellung)
Auflösung (horizontal):	250 Zeilen (Bildschärfe-Einsteller in Mittelstellung)

Audio

Eingang:	– 20 dBs, 50 kOhm unsymmetrisch
Ausgang:	– 6 dBs
Ausgangsimpedanz:	≦ 1 kOhm, unsymmetrisch
Signal/Rauschverhältnis:	≧ 40 dB
Frequenzbereich:	70 – 10000 Hz

TV-Tuner/HF-Teil

Antenneneingang:	VHF Band I	47 – 118 MHz
	VHF Band III	118 – 300 MHz
	UHF Band IV, V	470 – 862 MHz
Antennenausgang:	UHF-Kanäle 32 – 40 (einstellbar)	

Schaltuhr

Display:	24-Stunden-Fluoreszens-Digital-Anzeige mit Tagesangabe
Synchronisation:	Quarz-Oszillator
Vorprogrammierzeitraum:	2 Wochen; eine autom. Aufnahme
Programmspeicherplätze:	8 – 12 Programme

Mechanische Daten

Abmessungen (B × H × T):	435 mm × 95 mm × 376 mm
Gewicht:	8,7 kg
Umgebungstemperatur:	
Betrieb:	5 °C – 40 °C
Lagerung:	– 20 °C – 60°C

Technical specifications

System Data

Format:	VHS Pal standard
TV Standard:	CCIR-625 lines-Pal
Tape width:	12.65 mm
Recording time:	max. 4 hours with E-240 Video cassette

Connection Data

Mains connection:	220 V∼, 50/60 Hz
Power consumption:	30 Watt

Video

Input:	0.5 to 2.0 V_{P-P}, 75 ohms, unbalanced
Output:	1.0 V_{P-P}, 75 ohms, unbalanced
S/N ratio:	43 dB (Picture Sharpness control at centre position)
Horizontal resolution:	250 lines (Picture Sharpness control at centre position)

Audio

Input:	– 20 dBs, 50 k-ohms, unbalanced
Output:	– 6 dBs
Output impedance:	≦ 1 k-ohms, unbalanced
S/N ratio:	≧ 40 dB
frequency range:	70 Hz to 10.000 Hz

TV tuner/RF section

Aerial input:	VHF band I,	47 – 118 MHz
	VHF band III	118 – 300 MHz
	UHF band IV, V	470 – 862 MHz
Aerial output:	UHF channels 32 – 40 (adjustable)	

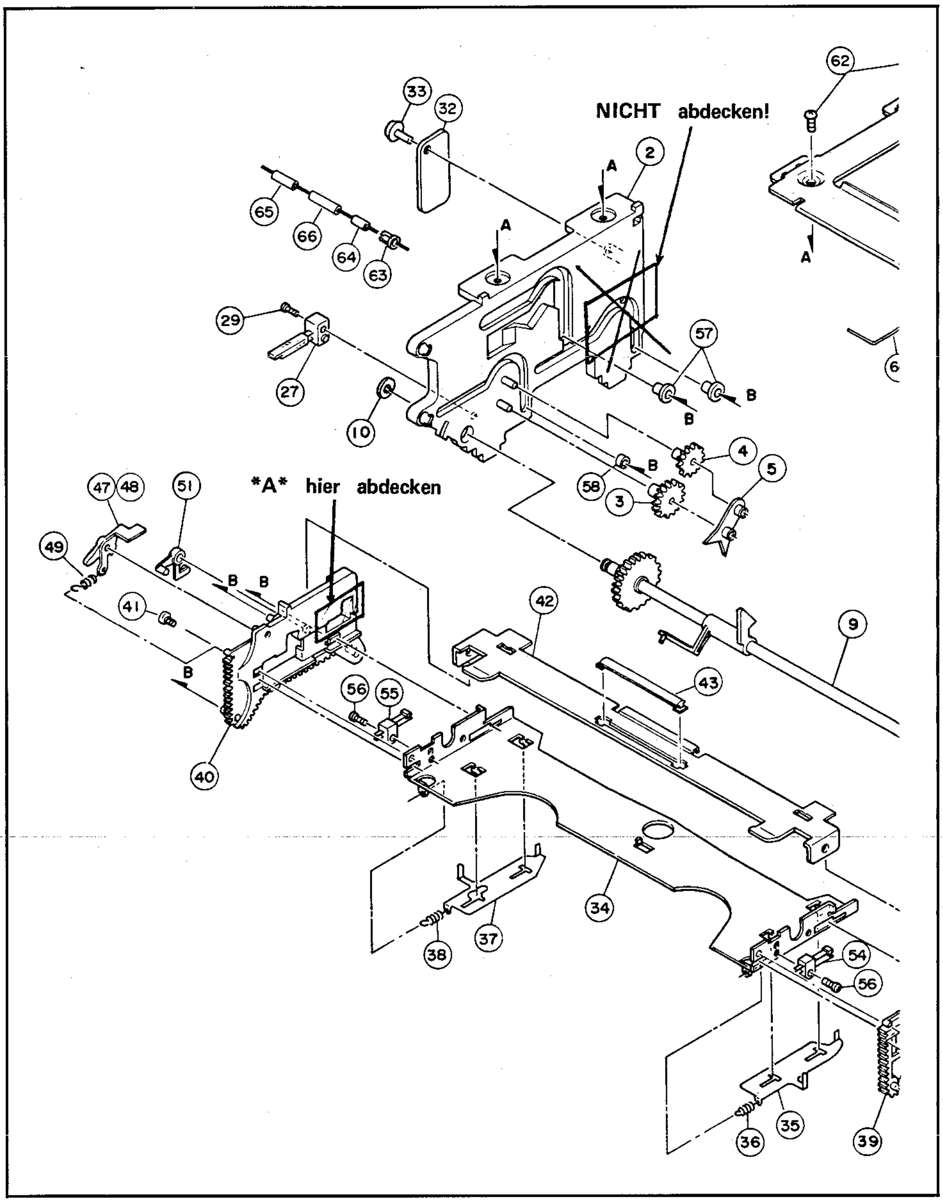
Digital clock timer

Clock display:	24-hour fluorescent digital display with day indication
Reference frequency:	Quartz controlled
Start time setting:	Within 2 weeks; one event timer
Programming capacity:	8 – 12 programmes

Mechanical Data

Dimensions (W × H × D):	435 mm × 95 mm × 376 mm
Weight:	8.7 kg
Temperature:	
Operating:	5 °C to 40 °C
Storage:	– 20 °C to 60 °C

Hinweis:
Note:



Hinweis: Im Servicefall ist es oftmals erforderlich, den Videorecorder ohne eingelegte Cassette in den Wiedergabe-Aufnahmebetrieb zu schalten. Hierzu sollte folgendermaßen vorgegangen werden:

1. Die Bandanfang-Endesensoren müssen mit einem schwarzen Klebeband abgedeckt werden. Da dies NICHT unmittelbar an den Sensoren selbst erfolgen darf, muß dies für beide Sensoren an der bezeichneten Stelle *A* erfolgen. Darauf achten, daß kein Fremd-Streulicht die Sensoren trifft. Eventuell den Cassettenschacht abdecken.

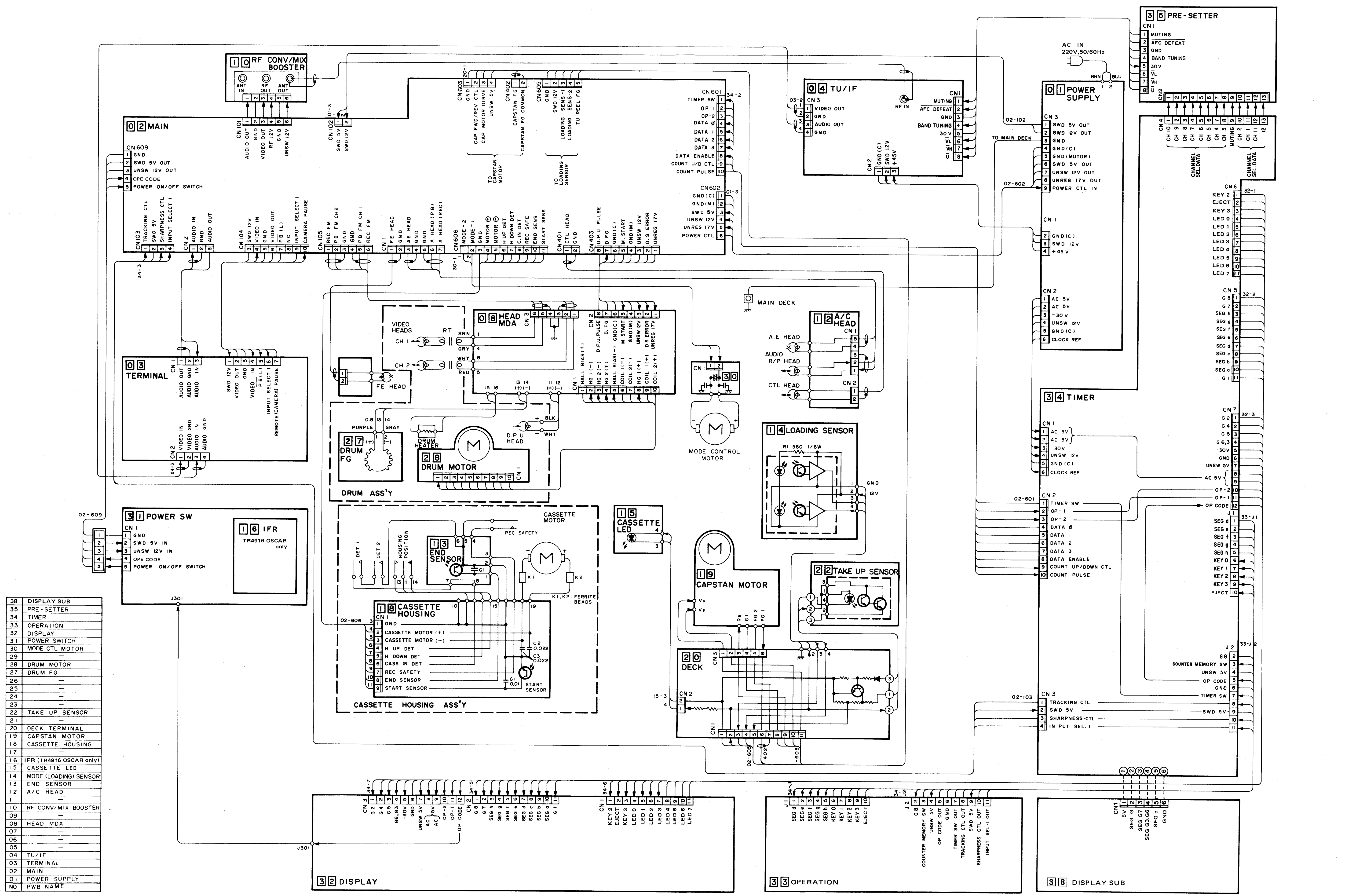
2. Über einen 1 kOhm Widerstand den Pin 31 des uP-IC´s 601, auf der MAIN-Platte 0 2 , nach Masse kurzschließen, bis der Cassettenschacht vollständig eingefahren ist. Danach kann der Recorder in den Wiedergabebetrieb geschaltet werden. Für Aufnahme ist lediglich noch der auf der Achse mit Pos.-Nr. 9 sitzende REC-SAFETY-Hebel zu betätigen.

Importsnt: For effecient servicing, it is often necessary to switch the equipment to the play-record mode without a cassette compartment. This requires the following actions:

1. The tape end photo sensors must be covered with black tape. Since the sensors must not be covered directly, covering takes place at the point marked *A*. Ensure that no stray light is able to reach the sensors. If necessary, cover the cassette compartment.

2. Connect pin 31 of IC uP 601 on MAIN BOARD 0 2 via a 1 kOhm resistor to earth, until the cassette lift is all the way lowered. The recorder can then be switched to the play mode. To switch from the play to the recording mode, it is then only necessary to operate the REC-SAFETY lever on the shaft assigned Pos.-No. 9.

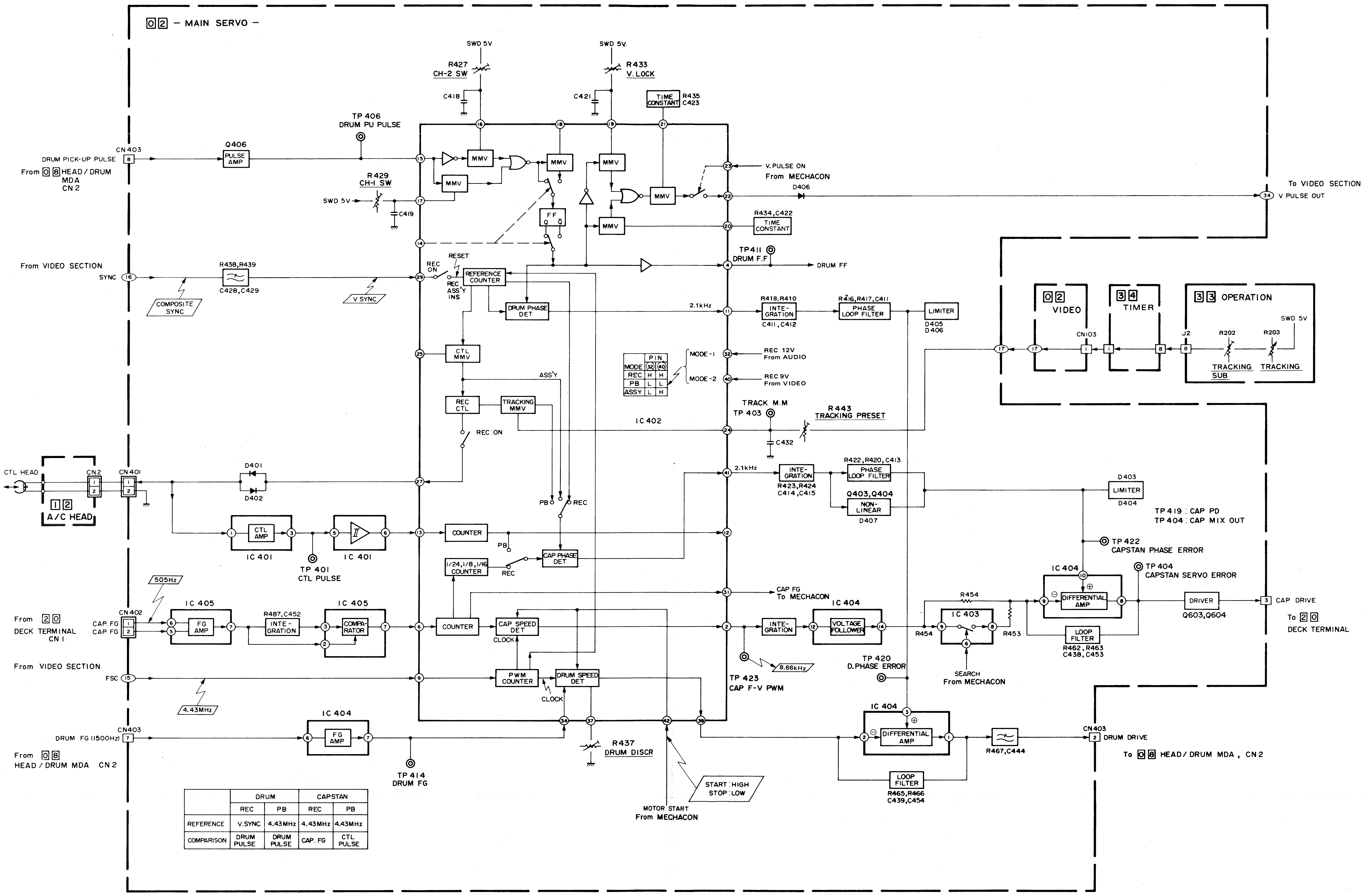
Gesamtverdrahtungsplan
Overall Wiring Diagram



10 RF CONV/MIX BOOSTER
ANT IN
RF OUT
ANT OUT
02 MAIN
CN609
GND
SWD 5V OUT
UNSW 12V OUT
OPE CODE
POWER ON/OFF SWITCH
CN101
AUDIO OUT
GND
VIDEO OUT
RF 12V
GND
UNSW 12V
CN102
SWD 5V
SWD 12V
CN603
CAP FWD/REV CTL
CAP MOTOR DIRVE
UNSW 5V
CN402
CAPSTAN FG
CAPSTAN FG COMMON
TO CAPSTAN MOTOR
CN605
GND
SWD 12V
LOADING SENS-1
LOADING SENS-2
TU REEL FG
TO LOADING SENSOR
CN601
TIMER SW
OP-1
OP-2
DATA 0
DATA 1
DATA 2
DATA 3
DATA ENABLE
COUNT U/D CTL
COUNT PULSE
CN602
GND(C)
GND(M)
SWD 5V
UNSW 12V
UNREG 17V
POWER CTL
CN103
TRACKING CTL
SWD 5V
SHARPNESS CTL
INPUT SELECT 1
CN2
AUDIO IN
GND
AUDIO OUT
CN104
SWD 12V
VIDEO IN
GND
VIDEO OUT
PB (L)
NC
INPUT SELECT 1
CAMERA PAUSE
CN105
REC FM
PB FM CH2
GND
GND
PB FM CH 1
REC FM
CN1
FE HEAD
GND
AE HEAD
GND
A HEAD (PB)
A HEAD (REC)
CN606
MODE-2
MODE-1
GND
MOTOR ⊕
MOTOR ⊖
H UP DET
H DOWN DET
C. IN DET
REC SAFE
END SENS
START SENS
CN401
CTL HEAD
GND
CN403
D.P.U PULSE
D.FG
GND(C)
M.START
GND(M)
UNSW 12V
D.S ERROR
UNREG 17V
03 TERMINAL
AUDIO OUT
AUDIO GND
AUDIO IN
SWD 12V
VIDEO OUT
GND
VIDEO IN
PB (L)
INPUT SELECT 1
REMOTE (CAMERA) PAUSE
VIDEO IN
VIDEO GND
AUDIO IN
AUDIO GND
04 TU/IF
VIDEO OUT
GND
AUDIO OUT
GND
RF IN
MUTING
AFC DEFEAT
GND
BAND TUNING
30V
VL
VH
VU
GND (C)
SWD 12V
+45V
01 POWER SUPPLY
AC IN 220V,50/60Hz
BRN
BLU
TO MAIN DECK
SWD 5V OUT
SWD 12V OUT
GND
GND(C)
GND (MOTOR)
SWD 5V OUT
UNSW 12V OUT
UNREG 17V OUT
POWER CTL IN
+45V
AC 5V
-30V
UNSW 12V
GND (C)
CLOCK REF
35 PRE-SETTER
MUTING
AFC DEFEAT
GND
BAND TUNING
30V
CH 1 – CH 12
MUTING
CHANNEL SEL.DATA
VIDEO HEADS
RT
CH 1
CH 2
BRN
GRY
WHT
RED
FE HEAD
08 HEAD MDA
HALL BIAS (+)
HG 1 (-)
HG 2 (+)
HALL BIAS(-)
COIL 2(-)
COIL 2(+)
COIL 1(+)
HG 1 (+)
COIL 2(+)
D.P.U PULSE
D.FG
GND(C)
M.START
GND(M)
UNSW 12V
DS ERROR
UNREG 17V
27 DRUM FG
PURPLE
GRAY
DRUM HEATER
28 DRUM MOTOR
D.P.U HEAD
BLK
WHT
DRUM ASS'Y
MAIN DECK
12 A/C HEAD
A.E HEAD
AUDIO R/P HEAD
CTL HEAD
30
MODE CONTROL MOTOR
14 LOADING SENSOR
R1 560 1/6W
GND
12V
31 POWER SW
GND
SWD 5V IN
UNSW 12V IN
OPE CODE
POWER ON/OFF SWITCH
16 IFR
TR4916 OSCAR only
J301
CASSETTE MOTOR
REC SAFETY
DET 1
DET 2
HOUSING POSITION
13 END SENSOR
K1
K2
K1,K2: FERRITE BEADS
18 CASSETTE HOUSING
CASSETTE MOTOR (+)
CASSETTE MOTOR (-)
H UP DET
H DOWN DET
CASS IN DET
REC SAFETY
END SENSOR
START SENSOR
C2 0.022
C3 0.022
C1 0.01
START SENSOR
CASSETTE HOUSING ASS'Y
15 CASSETTE LED
19 CAPSTAN MOTOR
22 TAKE UP SENSOR
20 DECK
34 TIMER
AC 5V
-30V
UNSW 12V
GND (C)
CLOCK REF
TIMER SW
OP-1
OP-2
DATA 0
DATA 1
DATA 2
DATA 3
DATA ENABLE
COUNT UP/DOWN CTL
COUNT PULSE
TRACKING CTL
SWD 5V
SHARPNESS CTL
IN PUT SEL. 1
KEY 2
EJECT
KEY 3
LED 0 – LED 7
G8
G7
SEG h
SEG g
SEG f
SEG e
SEG d
SEG c
SEG b
SEG a
G1
G2
G4
G5
G6,3
GND
UNSW 5V
OP CODE
KEY 0
KEY 1
COUNTER MEMORY SW
TIMER SW
32 DISPLAY
33 OPERATION
38 DISPLAY SUB
5V
SEG G
SEG G7
SEG G3,G6
SEG c
GND

38	DISPLAY SUB
35	PRE-SETTER
34	TIMER
33	OPERATION
32	DISPLAY
31	POWER SWITCH
30	MODE CTL MOTOR
29	—
28	DRUM MOTOR
27	DRUM FG
26	—
25	—
24	—
23	—
22	TAKE UP SENSOR
21	—
20	DECK TERMINAL
19	CAPSTAN MOTOR
18	CASSETTE HOUSING
17	—
16	IFR (TR4916 OSCAR only)
15	CASSETTE LED
14	MODE (LOADING) SENSOR
13	END SENSOR
12	A/C HEAD
11	—
10	RF CONV/MIX BOOSTER
09	—
08	HEAD MDA
07	—
06	—
05	—
04	TU/IF
03	TERMINAL
02	MAIN
01	POWER SUPPLY
NO	PWB NAME

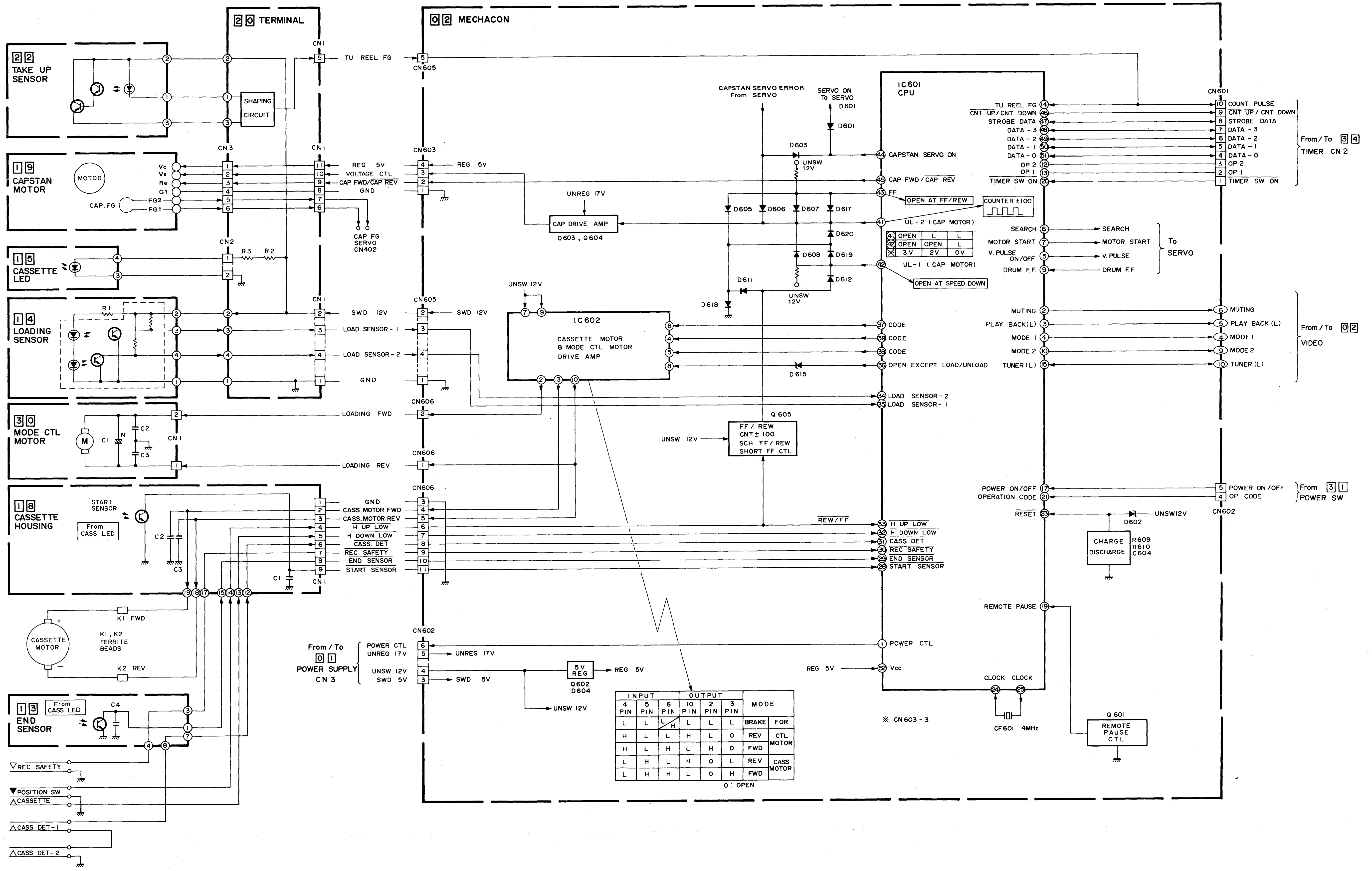
Servo-Blockdarstellung
Servo Block Diagram


02 - MAIN SERVO -
SWD 5V
R427
CH-2 SW
SWD 5V
R433
V. LOCK
C418
C421
TIME CONSTANT
R435
C423
TP 406
DRUM PU PULSE
CN 403
DRUM PICK-UP PULSE
From 08 HEAD / DRUM MDA CN 2
Q406
PULSE AMP
MMV
R429
CH-1 SW
SWD 5V
C419
FF
V. PULSE ON
From MECHACON
D406
To VIDEO SECTION
V. PULSE OUT
R434,C422
TIME CONSTANT
TP411
DRUM F.F
DRUM FF
RESET
REC ON
REC ASS'Y INS
REFERENCE COUNTER
From VIDEO SECTION
SYNC
R438,R439
C428,C429
COMPOSITE SYNC
V.SYNC
DRUM PHASE DET
2.1kHz
R418,R410
INTE-GRATION
C411,C412
R416,R417,C411
PHASE LOOP FILTER
LIMITER
D405
D406
02
VIDEO
CN103
34
TIMER
33
OPERATION
SWD 5V
J2
R202
R203
TRACKING SUB
TRACKING
CTL MMV
MODE-1
MODE-2
REC 12V
From AUDIO
REC 9V
From VIDEO
ASS'Y
REC CTL
TRACKING MMV
IC 402
TRACK M.M
TP 403
R443
TRACKING PRESET
C432
REC:ON
CTL HEAD
CN2
CN401
12
A/C HEAD
D401
D402
PB
REC
2.1kHz
INTE-GRATION
R423,R424
C414,C415
R422,R420,C413
PHASE LOOP FILTER
Q403,Q404
NON-LINEAR
D407
D403
LIMITER
D404
TP419 : CAP PD
TP404 : CAP MIX OUT
CTL AMP
IC 401
IC 401
TP 401
CTL PULSE
COUNTER
PB
1/24,1/8,1/16 COUNTER
REC
CAP PHASE DET
TP 422
CAPSTAN PHASE ERROR
TP 404
CAPSTAN SERVO ERROR
IC 404
505Hz
CAP FG
To MECHACON
R454
DIFFERENTIAL AMP
DRIVER
Q603,Q604
CAP DRIVE
To 20 DECK TERMINAL
From 20 DECK TERMINAL CN 1
CN402
CAP. FG
CAP. FG
IC 405
FG AMP
R487,C452
INTE-GRATION
IC 405
COMPA-RATOR
COUNTER
CAP SPEED DET
CLOCK
INTE-GRATION
IC 404
VOLTAGE FOLLOWER
IC 403
R454
R453
LOOP FILTER
R462,R463
C438,C453
SEARCH
From MECHACON
8.66kHz
TP 420
D.PHASE ERROR
TP 423
CAP F-V PWM
From VIDEO SECTION
FSC
4.43MHz
PWM COUNTER
DRUM SPEED DET
CLOCK
IC 404
DIFFERENTIAL AMP
R467,C444
CN403
DRUM DRIVE
To 08 HEAD / DRUM MDA, CN2
CN403
DRUM FG (1500Hz)
From 08 HEAD / DRUM MDA CN 2
IC 404
FG AMP
TP 414
DRUM FG
R437
DRUM DISCR
START : HIGH
STOP : LOW
MOTOR START
From MECHACON
LOOP FILTER
R465,R466
C439,C454

	PIN	
MODE	32	40
REC	H	H
PB	L	L
ASSY	L	H

	DRUM		CAPSTAN	
	REC	PB	REC	PB
REFERENCE	V.SYNC	4.43MHz	4.43MHz	4.43MHz
COMPARISON	DRUM PULSE	DRUM PULSE	CAP. FG	CTL PULSE

Mechacon-Blockdarstellung
Mechacon Block Diagram

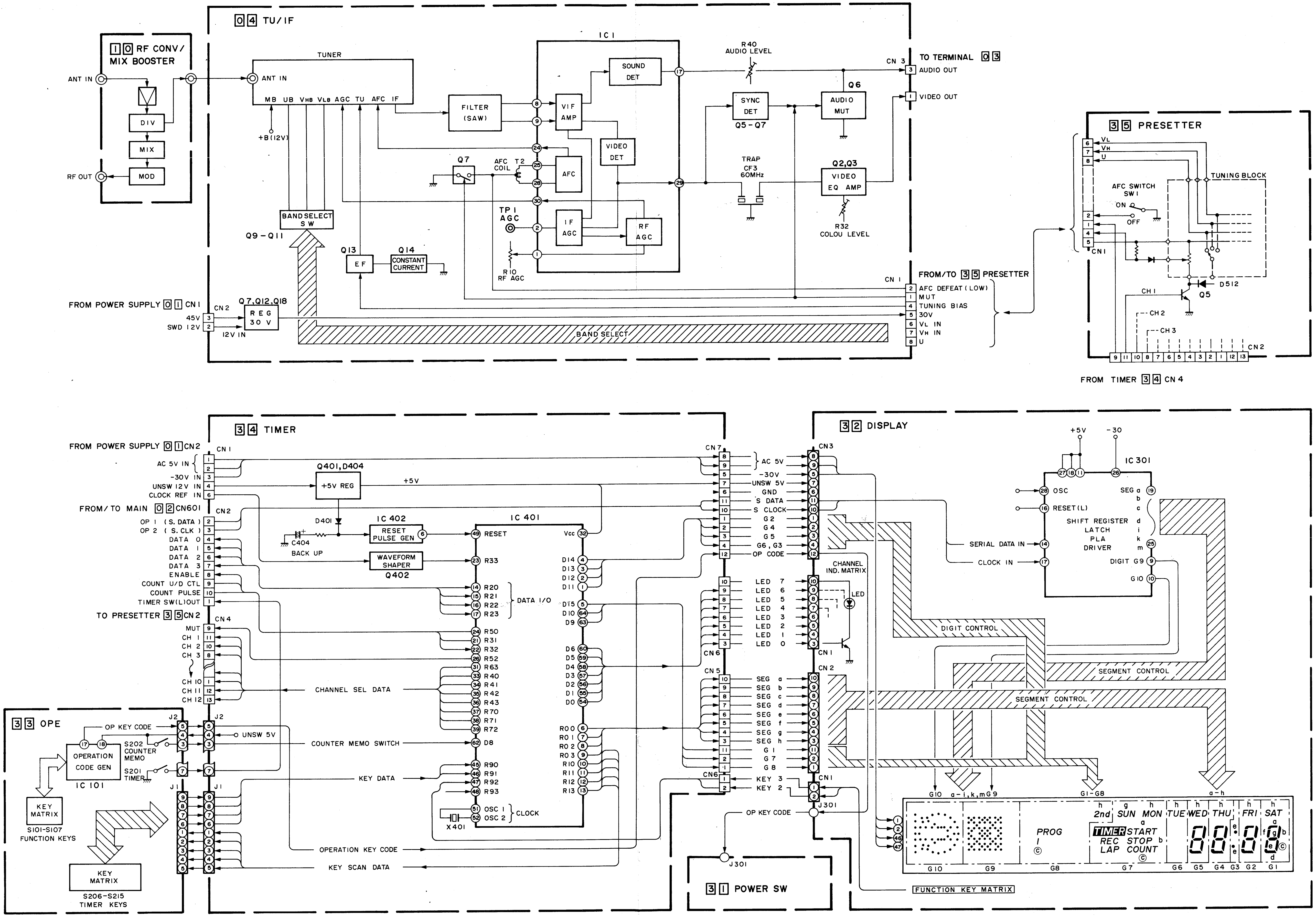


2 0 TERMINAL
0 2 MECHACON
2 2 TAKE UP SENSOR
SHAPING CIRCUIT
CN1
TU REEL FG
CN605
CN3
CN603
1 9 CAPSTAN MOTOR
MOTOR
Vc
Vs
Re
G1
FG2
FG1
CAP. FG
REG 5V
VOLTAGE CTL
CAP FWD/CAP REV
GND
CAP FG SERVO CN402
CN2
R3
R2
1 5 CASSETTE LED
1 4 LOADING SENSOR
R1
SWD 12V
LOAD SENSOR - 1
LOAD SENSOR - 2
GND
3 0 MODE CTL MOTOR
M
C1
N
C2
C3
LOADING FWD
LOADING REV
CN606
1 8 CASSETTE HOUSING
START SENSOR
From CASS LED
CASS. MOTOR FWD
CASS. MOTOR REV
H UP LOW
H DOWN LOW
CASS. DET
REC SAFETY
END SENSOR
START SENSOR
CASSETTE MOTOR
K1 FWD
K2 REV
K1, K2 FERRITE BEADS
1 3 END SENSOR
C4
REC SAFETY
POSITION SW
CASSETTE
CASS DET - 1
CASS DET - 2
UNREG 17V
CAP DRIVE AMP
Q603, Q604
UNSW 12V
IC602
CASSETTE MOTOR & MODE CTL MOTOR DRIVE AMP
CAPSTAN SERVO ERROR From SERVO
SERVO ON To SERVO
D601
D603
D605
D606
D607
D617
D620
D608
D619
D611
D612
D618
D615
Q605
FF / REW CNT± 100 SCH FF / REW SHORT FF CTL
IC601 CPU
CAPSTAN SERVO ON
CAP FWD / CAP REV
FF
OPEN AT FF/REW
COUNTER ±100
UL - 2 (CAP MOTOR)
UL - 1 (CAP MOTOR)
OPEN AT SPEED DOWN
41 OPEN L L
42 OPEN OPEN L
3V 2V 0V
CODE
OPEN EXCEPT LOAD/UNLOAD
LOAD SENSOR - 2
LOAD SENSOR - 1
REW/FF
H UP LOW
H DOWN LOW
CASS DET
REC SAFETY
END SENSOR
START SENSOR
POWER CTL
Vcc
REG 5V
CN602
From / To 0 1 POWER SUPPLY CN 3
POWER CTL
UNREG 17V
UNSW 12V
SWD 5V
5V REG
Q602 D604
REG 5V
SWD 5V
TU REEL FG
CNT UP / CNT DOWN
STROBE DATA
DATA - 3
DATA - 2
DATA - 1
DATA - 0
OP 2
OP 1
TIMER SW ON
CN601
COUNT PULSE
CNT UP / CNT DOWN
STROBE DATA
From / To 3 4 TIMER CN 2
SEARCH
MOTOR START
V. PULSE ON/OFF
DRUM F.F.
To SERVO
MUTING
PLAY BACK(L)
MODE 1
MODE 2
TUNER (L)
From / To 0 2 VIDEO
POWER ON/OFF
OPERATION CODE
OP CODE
From 3 1 POWER SW
RESET
UNSW12V
D602
CHARGE DISCHARGE
R609 R610 C604
REMOTE PAUSE
CLOCK CLOCK
CF601 4MHz
Q601
REMOTE PAUSE CTL
※ CN603 - 3

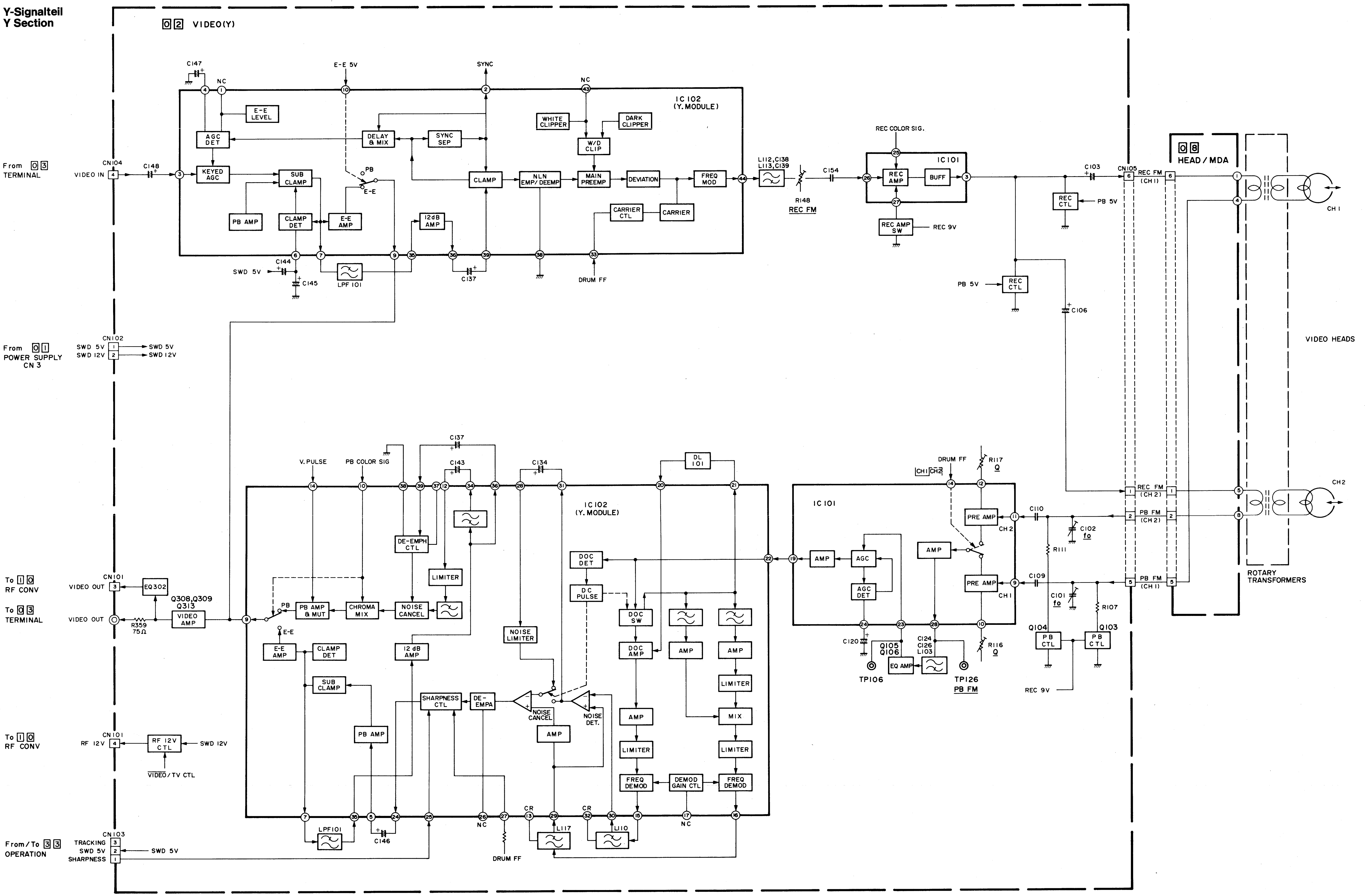
INPUT			OUTPUT			MODE	
4 PIN	5 PIN	6 PIN	10 PIN	2 PIN	3 PIN		
L	L	L / H	L	L	L	BRAKE	FOR
H	L	L	H	L	O	REV	CTL MOTOR
H	L	H	L	H	O	FWD	
L	H	L	H	O	L	REV	CASS MOTOR
L	H	H	L	O	H	FWD	

O : OPEN

Tuner/ZF/Timer/Anzeige-Blockdarstellung
Tuner/IF/Timer/Display Block Diagram

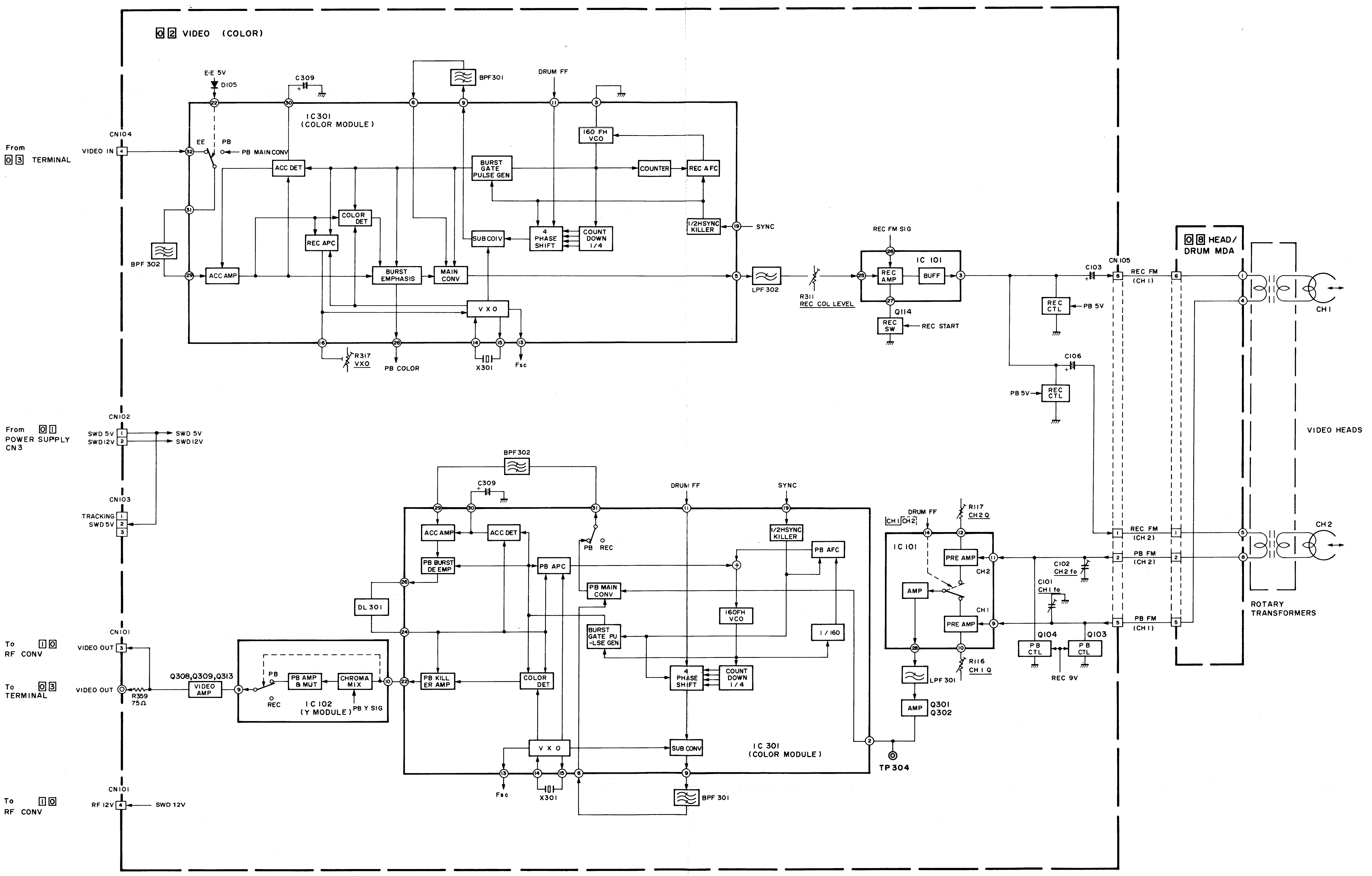

10 RF CONV/ MIX BOOSTER
ANT IN
DIV
MIX
MOD
RF OUT
04 TU/IF
TUNER
ANT IN
MB UB VHB VLB AGC TU AFC IF
+B (12V)
FILTER (SAW)
IC 1
SOUND DET
VIF AMP
VIDEO DET
AFC
IF AGC
RF AGC
Q7
AFC COIL T2
TP1 AGC
R10 RF AGC
BAND SELECT SW
Q9-Q11
Q13
EF
Q14
CONSTANT CURRENT
R40 AUDIO LEVEL
SYNC DET
Q5-Q7
Q6
AUDIO MUT
TRAP CF3 60MHz
Q2,Q3
VIDEO EQ AMP
R32 COLOU LEVEL
CN 3
TO TERMINAL 03
AUDIO OUT
VIDEO OUT
FROM/TO 35 PRESETTER
CN 1
AFC DEFEAT (LOW)
MUT
TUNING BIAS
30V
VL IN
VH IN
U
FROM POWER SUPPLY 01 CN1
CN 2
45V
SWD 12V
Q7,Q12,Q18
REG 30 V
12V IN
BAND SELECT
35 PRESETTER
VL
VH
U
AFC SWITCH SW1
ON
OFF
TUNING BLOCK
CN1
D512
CH 1
Q5
CH 2
CH 3
CN2
FROM TIMER 34 CN 4
34 TIMER
FROM POWER SUPPLY 01 CN2
CN 1
AC 5V IN
-30V IN
UNSW 12V IN
CLOCK REF IN
FROM/TO MAIN 02 CN601
CN 2
OP 1 (S. DATA)
OP 2 (S. CLK)
DATA 0
DATA 1
DATA 2
DATA 3
ENABLE
COUNT U/D CTL
COUNT PULSE
TIMER SW(L) OUT
TO PRESETTER 35 CN2
CN 4
MUT
CH 1
CH 2
CH 3
CH 10
CH 11
CH 12
Q401, D404
+5V REG
+5V
D401
C404 BACK UP
IC 402
RESET PULSE GEN
WAVEFORM SHAPER
Q402
IC 401
RESET
Vcc
R33
R20
R21
R22
R23
DATA I/O
R50
R31
R32
R52
R63
R40
R41
R42
R43
R70
R71
R72
D8
R90
R91
R92
R93
OSC 1
OSC 2
CLOCK
X401
D14 D13 D12 D11
D15 D10 D9
D6 D5 D4 D3 D2 D1 D0
RO0 RO1 RO2 RO3 R10 R11 R12 R13
CHANNEL SEL DATA
COUNTER MEMO SWITCH
KEY DATA
OPERATION KEY CODE
KEY SCAN DATA
UNSW 5V
CN 7
AC 5V
-30V
UNSW 5V
GND
S DATA
S CLOCK
G 2
G 4
G 5
G6, G3
OP CODE
LED 7
LED 6
LED 5
LED 4
LED 3
LED 2
LED 1
LED 0
CN 6
CN 5
SEG a
SEG b
SEG c
SEG d
SEG e
SEG f
SEG g
SEG h
G 1
G 7
G 8
KEY 3
KEY 2
33 OPE
OP KEY CODE
IC 101
OPERATION CODE GEN
S202 COUNTER MEMO
S201 TIMER
J2
J1
KEY MATRIX
S101-S107 FUNCTION KEYS
KEY MATRIX
S206-S215 TIMER KEYS
32 DISPLAY
CN3
CHANNEL IND. MATRIX
LED
CN 1
CN 2
+5V
-30
IC 301
OSC
RESET (L)
SHIFT REGISTER
LATCH
PLA
DRIVER
SEG a b c d i k m
DIGIT G9
G10
SERIAL DATA IN
CLOCK IN
DIGIT CONTROL
SEGMENT CONTROL
SEGMENT CONTROL
G10
a-i, k, m G9
G1-G8
a-h
J301
OP KEY CODE
2nd SUN MON TUE WED THU FRI SAT
PROG
TIMER START
REC STOP
LAP COUNT
G10 G9 G8 G7 G6 G5 G4 G3 G2 G1
FUNCTION KEY MATRIX
J301
31 POWER SW

Video-Blockdarstellung
Video Block Diagram


Y-Signalteil
Y Section
02 VIDEO(Y)
From 03 TERMINAL
VIDEO IN
CN104
C148
C147
NC
E-E 5V
SYNC
NC
IC102 (Y. MODULE)
E-E LEVEL
AGC DET
KEYED AGC
SUB CLAMP
PB AMP
CLAMP DET
E-E AMP
DELAY & MIX
SYNC SEP
PB
E-E
12dB AMP
CLAMP
NLN EMP/DEEMP
WHITE CLIPPER
DARK CLIPPER
W/D CLIP
MAIN PREEMP
DEVIATION
FREQ MOD
CARRIER CTL
CARRIER
SWD 5V
C144
C145
LPF 101
C137
DRUM FF
L112,C138
L113,C139
R148
REC FM
C154
REC COLOR SIG.
IC101
REC AMP
BUFF
REC AMP SW
REC 9V
C103
CN105
REC FM (CH1)
REC CTL
PB 5V
REC CTL
PB 5V
C106
08 HEAD / MDA
CH1
VIDEO HEADS
CH2
From 01 POWER SUPPLY CN3
CN102
SWD 5V
SWD 12V
V. PULSE
PB COLOR SIG
C137
C143
C134
DL 101
DRUM FF
R117 Q
CH1 CH2
IC102 (Y. MODULE)
IC101
DE-EMPH CTL
LIMITER
NOISE CANCEL
CHROMA MIX
PB AMP & MUT
DOC DET
DC PULSE
DOC SW
DOC AMP
AMP
LIMITER
MIX
FREQ DEMOD
DEMOD GAIN CTL
PRE AMP
AGC
AGC DET
CH2
CH1
C110
C102 fo
R111
C109
C101 fo
R107
REC FM (CH2)
PB FM (CH2)
PB FM (CH1)
ROTARY TRANSFORMERS
To 10 RF CONV
To 03 TERMINAL
CN101
VIDEO OUT
EQ302
Q308,Q309 Q313
VIDEO AMP
R359 75Ω
E-E AMP
CLAMP DET
SUB CLAMP
PB AMP
12 dB AMP
SHARPNESS CTL
DE-EMPA
NOISE LIMITER
NOISE CANCEL
NOISE DET.
R116 Q
C120
Q105 Q106
C124 C126 L103
EQ AMP
TP106
TP126 PB FM
Q104 PB CTL
Q103 PB CTL
REC 9V
To 10 RF CONV
RF 12V
RF 12V CTL
SWD 12V
VIDEO/TV CTL
From/To 33 OPERATION
CN103
TRACKING
SWD 5V
SHARPNESS
LPF101
C146
NC
DRUM FF
CR
L117
L110
NC

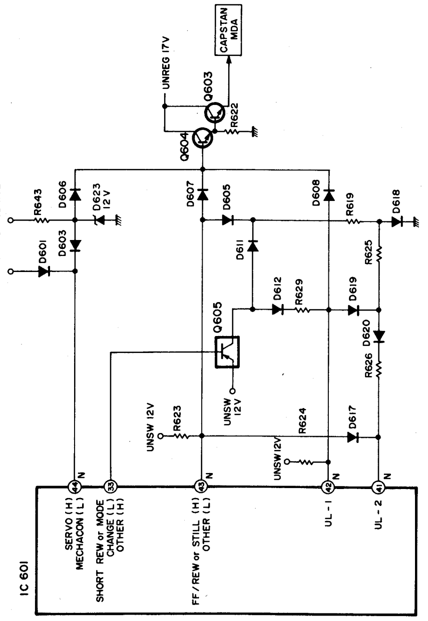
Video-Blockdarstellung
Video Block Diagram

Farbsignalteil
Color Section



02 VIDEO (COLOR)
From 03 TERMINAL
VIDEO IN
CN104
E-E 5V
D105
C309
BPF301
DRUM FF
IC301 (COLOR MODULE)
EE
PB
PB MAIN CONV
ACC DET
BURST GATE PULSE GEN
160 FH VCO
COUNTER
REC AFC
COLOR DET
REC APC
SUB CONV
4 PHASE SHIFT
COUNT DOWN 1/4
1/2HSYNC KILLER
SYNC
BPF 302
ACC AMP
BURST EMPHASIS
MAIN CONV
VXO
LPF 302
R311 REC COL LEVEL
REC FM SIG
IC 101
REC AMP
BUFF
Q114
REC SW
REC START
R317 VXO
PB COLOR
X301
Fsc
CN105
C103
REC FM (CH 1)
REC CTL
PB 5V
C106
08 HEAD/ DRUM MDA
CH1
VIDEO HEADS
From 01 POWER SUPPLY CN3
CN102
SWD 5V
SWD12V
CN103
TRACKING
BPF302
DRUM FF
SYNC
ACC AMP
ACC DET
PB REC
1/2HSYNC KILLER
PB AFC
PB BURST DE EMP
PB APC
PB MAIN CONV
DL 301
160FH VCO
BURST GATE PU -LSE GEN
1/160
To 10 RF CONV
CN101
VIDEO OUT
To 03 TERMINAL
R359 75Ω
Q308,Q309,Q313
VIDEO AMP
PB AMP & MUT
CHROMA MIX
REC
IC 102 (Y MODULE)
PB Y SIG
PB KILL ER AMP
COLOR DET
4 PHASE SHIFT
COUNT DOWN 1/4
VXO
SUB CONV
IC 301 (COLOR MODULE)
BPF 301
To 10 RF CONV
RF 12V
SWD 12V
CH1 CH2
R117 CH2 Q
IC 101
PRE AMP
CH2
AMP
CH1
R116 CH1 Q
LPF 301
Q301 Q302
TP304
C102 CH2 fo
C101 CH1 fo
Q104
Q103
PB CTL
REC 9V
REC FM (CH 2)
PB FM (CH 2)
PB FM (CH 1)
CH2
ROTARY TRANSFORMERS

Capstanmotorregelung
Capstan motor control circuit


CAPSTAN MDA
UNREG 17V
Q603
Q604
R622
CAP. DRIVE
SERVO
R643
D606
D623 12V
D601
D603
D607
D605
D608
R619
D618
D611
R625
D612
R629
D619
Q605
D620
R626
UNSW 12V
R623
R624
D617
UNSW 12V
N
44
33
43
42
41
SERVO (H) MECHACON (L)
SHORT REW or MODE CHANGE (L) OTHER (H)
FF/REW or STILL (H) OTHER (L)
UL-1
UL-2
IC 601

Ausgangssignale des IC601
Output signals of IC601

Mode / Measuring points	STOP	FF/REW	FF/REW ±100	SHORT FF	SHORT REW	IDLER CHANGE	MODE SHIFT	BACK SPACE	UNLOADING	STILL (Noise transmission)
IC601-㊹	L	L	L	L	L	L	L	OPEN	L	L
IC601-㉝	OPEN 12 V	OPEN 12 V	OPEN 12 V	OPEN 12 V	L	OPEN 12 V	OPEN 12 V	L	OPEN 12 V	OPEN 12 V
IC601-㊸	L	OPEN 10 V	OPEN ⊓⊔⊓	L	L	L	L	L	L	OPEN ⊓⊔⊓
IC601-㊷	L	L	L	OPEN 4 V	OPEN 7 V	OPEN 4 V	OPEN 7 V	L	OPEN 5 V/3 V	L
IC-601-㊶	L	OPEN 10 V	⊓⊔⊓	OPEN 4 V	OPEN 7 V	OPEN 4 V	OPEN 7 V	L	OPEN/L 4 V/0 V	⊓⊔⊓
CN603-3	0 V	8 V	⊓⊔⊓	3 V	5 V	3 V	5 V	SERVO	3 V/2 V	⊓⊔⊓

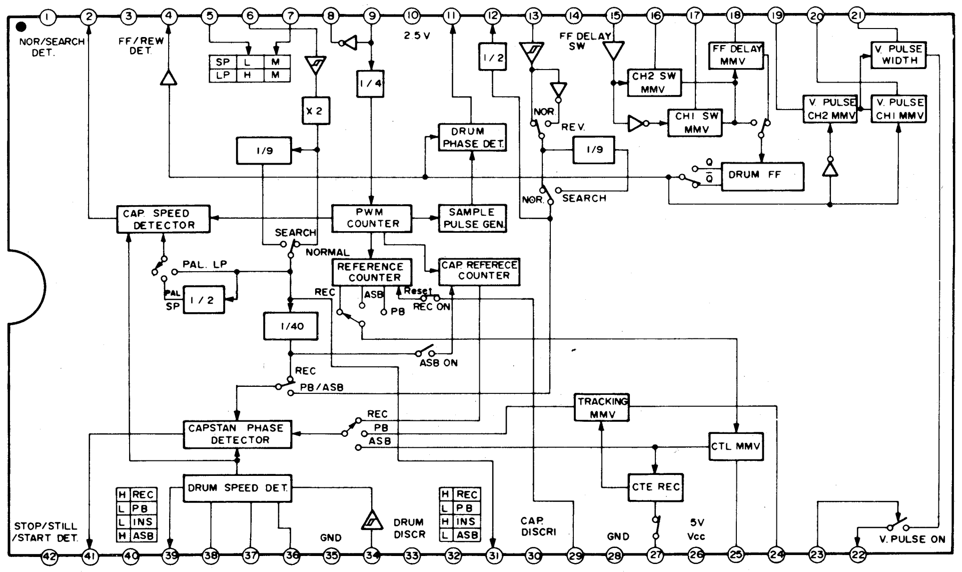
Anschlußbelegung IC601
Terminal function of IC601

PIN No.	SYMBOL		OUTPUT STATE	LABEL	IN/OUT	CONTENTS
1	Port 6	7	N-ch OPEN DRAIN	POWER ON/OFF	OUT	ON: L, OFF: H
2		6		AUDIO MUTE		MUTE: H, OTHER: L
3		5		AV PLAYBACK		PB: L, E-E: H
4		4		REC 12 V		ON: L, OFF: H
5		3		V. PULSE ON/OFF		ON (STILL, SEARCH): H, OFF: L
6		2		SERVO SEARCH		SEARCH: H, OTHER: L
7		1		SERVO MOTOR START		START: H, STOP: L
8		0		–		–
9	Port 2	7	N-ch OPEN DRAIN	DRUM FLIP-FLOP	IN	For detection of drum rotation and REC timing.
10		6		REC 9 V	OUT	ON: L, OFF: L
11		5		–		–
12		4		OPERATE-2	OUT	Refer to 3.6.3.
13		3		OPERATE-1		
14		2		TAKE-UP REEL FG	IN	For detection of TU reel rotation.
15		1		INPUT SEL. SW TUNER		TUNER: L, OTHER: H
16		0		–		–
17	Port 3	3	N-ch OPEN DRAIN	POWER SW	IN	ON: L, OFF: H
18		2		CAPSTAN FG		For Back space amount.
19		1		REMOTE PAUSE		ON: L, OFF: H
20		0		TIMER SW		ON: L, OFF: H
21	INT 1			OPERATION SIGNAL	IN	10 bit serial code.
22	CN Vss			GND		
23	RESET			RESET	IN	RESET: L
24	X IN			CLOCK	IN	4 MHz
25	X OUT			CLOCK	OUT	
26	ϕ			NC		
27	Vss			GND		
28	Port 5	3	–	START SENSOR	IN	ON: L, OFF: H
29		2		END SENSOR		
30		1		REC SAFETY SW		
31		0		CASSETTE IN SW		
32	Port 1	7	N-ch OPEN DRAIN	CASS. LOAD END SW	IN	ON: L, OFF: H
33		6		EJECT END SW		
34		5		LOADING SENSOR-2	IN	Refer to 3.1.2 - 1.
35		4		LOADING SENSOR-1		
36		3		MODE CTL./CASSETTE MOTOR CONTROL	OUT	Refer to 3.1.3 - 5.
37		2				
38		1				
39		0				
40	Port 2	7	N-ch OPEN DRAIN	–		–
41		6		UNLOAD-2	OUT	Refer to 3.1.3 - 6.
42		5		UNLOAD-1		
43		4		FF/REW/STILL		
44		3		CAPSTAN SERVO CTL.		
45		2		CAPSTAN FWD/REV		
46		1		COUNT UP/DOWN	OUT	
47		0		STROBE	IN	Refer to 3.1.3 - 4.
48	Port 4	3	P-ch OPEN DRAIN	DATA 3	IN/OUT	
49		2		DATA 2		
50		1		DATA 1		
51		0		DATA 0		
52	Vcc			5 V		

Note: N-ch OPEN DRAIN – with Pull-up transistor
P-ch OPEN DRAIN – with Pull-down transistor

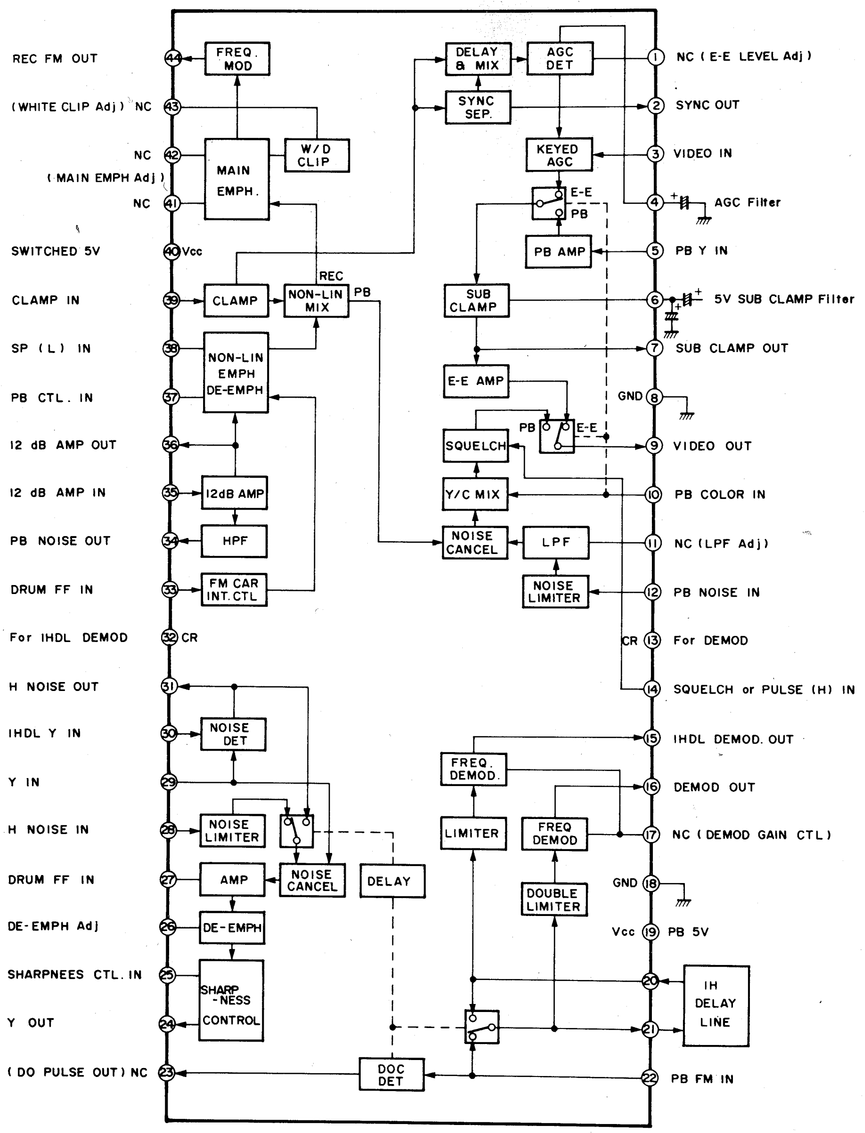
SERVO IC402 HA11827NT

SEARCH mode High (5V) Other Low	$\overline{\text{NOR}}$/SEARCH	①	㊷	STOP STILL START	STOP = Low Less than 1.5V STILL = Mid 1.5V~3.5V START = High more than 3.5V
8.66 kHz Cap. speed PWM out 8.66 kHz 5V DC 0.7 VDC	CAP. SPEED PWM OUT	②	㊶	CAPSTAN PHASE PWM OUT	2.165 kHz Capstan PWM out 4 Vp-p
FWD = Low REV = High	REV/$\overline{\text{FWD}}$	③	㊵	MODE CTL	REC = High PB = Low ASB = High
Drum Flip Flop out 6Vp-p	D. FF OUT	④	㊴	DRUM SPEED OUT	3 V approx. Voltage drops at slower rotation.
	SP/LP/EP SELECT	⑤	㊳	DRUM SPEED S/H	Approx. 2.1 V DC Voltage builds up at slower rotation.
500 Hz 3Vp-p	CAP FG IN	⑥	㊲	DRUM TRAPEZOID POWER SUP.	3VDC
	SP/LP/EP SELECT	⑦	㊱	DRUM SPEED TRAPEZOID	3Vp-p 1500 Hz Builds up at slower rotation.
4.43 MHz Fsc 1Vp-p	FSC	⑧	㉟	GND	—
4.43 MHz Fsc in 1Vp-p	FSC	⑨	㉞	DRUM FG IN	1.2 Vp-p 1500 Hz
Internal logic power approx. 2.5 V, 17 mA	INJECTOR	⑩	㉝	DRUM DISCRI CTL	Sets Forced Discri. mode as shortcircuited with Vcc.
Drum phase PWM out 2.165 kHz 4V	DRUM PHASE OUT	⑪	㉜	MODE CTL	REC = High PB = Low ASB = Low
1/2 CTL (REC/PB) 5 Vp-p 12.5 Hz	CTL OUT	⑫	㉛	CAPSTAN FG OUT	500 Hz 5 Vp-p
4Vp-p (REC/PB) 30Hz	PB CTL IN	⑬	㉚	CAPSTAN DISCRI CTL	Sets Forced Discri. mode as shortcircuited with Vcc.
High = Delay & NOR. Low = INV.	DRUM FF DELAY CTL	⑭	㉙	V. SYNC IN	V. SYNC 0.8Vp-p
Drum Pick-up pulse in 1.5Vp-p	DRUM PG IN	⑮	㉘	GND	—
5.5Vp-p	CH2 SW MMV	⑯	㉗	REC CTL OUT	Rec CTL signal 4.5Vp-p
5.5Vp-p	CH1 SW MMV	⑰	㉖	VCC	5.5V DC
3Vp-p	D. FF DELAY MMV	⑱	㉕	CTL DELAY MMV	
5.5Vp-p	V. PULSE CH2 MMV	⑲	㉔	TRACKING MMV	3Vp-p at Tracking center
5.5Vp-p	V. PULSE CH1 MMV	⑳	㉓	V. PULSE CTL	Normal Low V. pulse on High
3Vp-p	V. PULSE WIDTH	㉑	㉒	V. PULSE OUT	4.5Vp-p V. pulse out

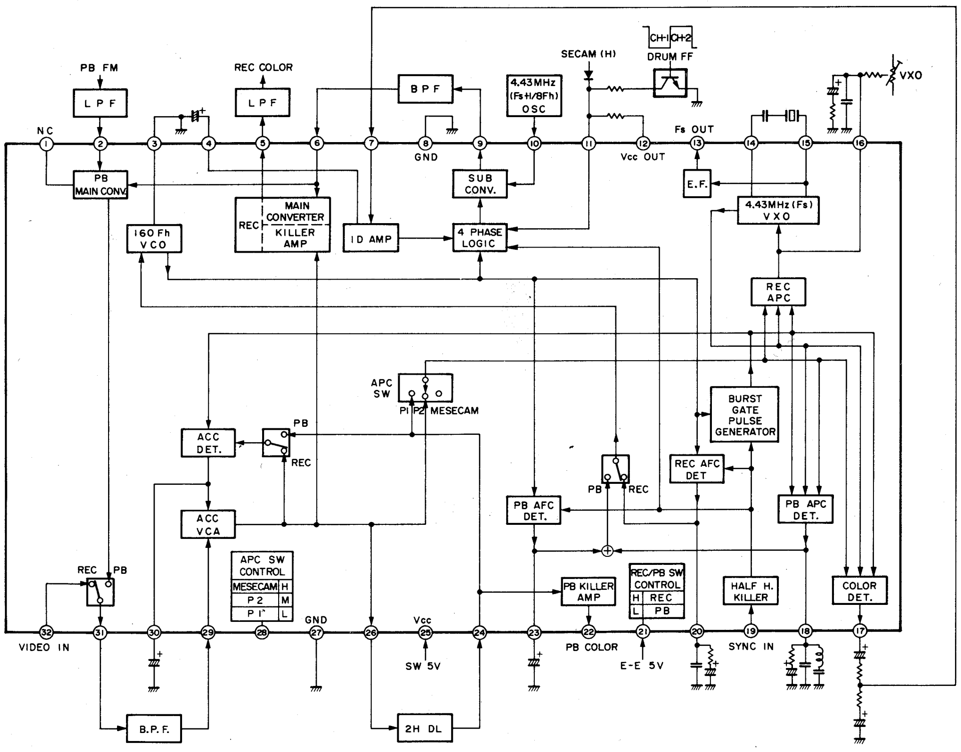

NOR/SEARCH DET.
FF/REW DET.
SP L M
LP H M
X 2
1/4
1/9
2.5V
1/2
FF DELAY SW
CH2 SW MMV
FF DELAY MMV
V. PULSE WIDTH
NOR
REV.
CH1 SW MMV
V. PULSE CH2 MMV
V. PULSE CH1 MMV
DRUM PHASE DET.
1/9
Q
Q̄
DRUM FF
NOR.
SEARCH
CAP. SPEED DETECTOR
PWM COUNTER
SAMPLE PULSE GEN.
SEARCH
NORMAL
PAL. LP
REFERENCE COUNTER
CAP. REFERECE COUNTER
PAL
SP
1/2
REC
ASB
Reset
PB
REC ON
1/40
ASB ON
REC
PB/ASB
TRACKING MMV
CAPSTAN PHASE DETECTOR
REC
PB
ASB
CTL MMV
CTE REC
DRUM SPEED DET.
H REC
L PB
L INS
H ASB
H REC
L PB
H INS
L ASB
STOP/STILL /START DET.
GND
DRUM DISCR
CAP. DISCRI
GND
5V Vcc
V. PULSE ON
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
42
41
40
39
38
37
36
35
34
33
32
31
30
29
28
27
26
25
24
23
22

Block-Schaltbild IC402 HA11827NT
Block diagram of IC402 HA11827NT

Y-Modul IC 102
Y-Module IC 102

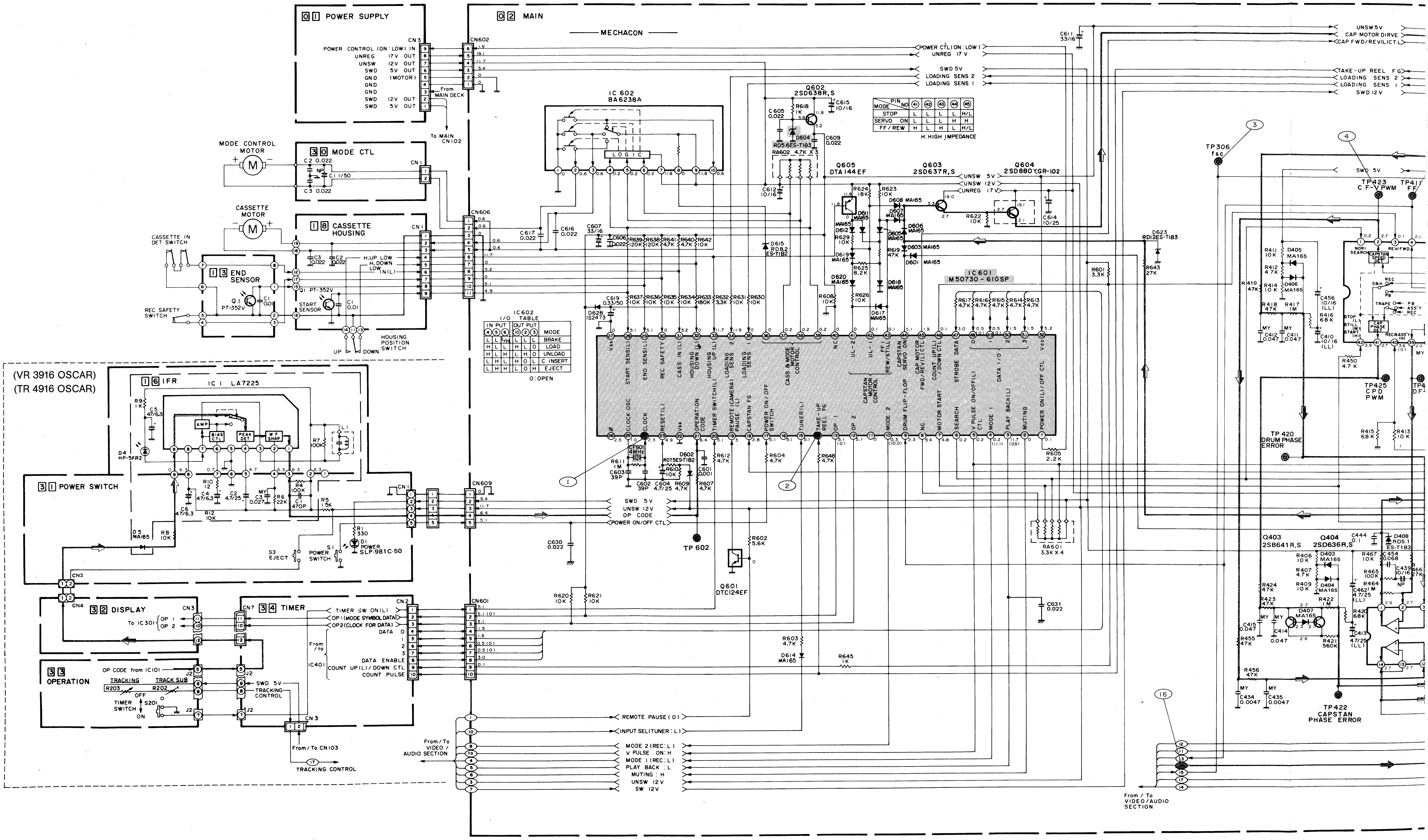

REC FM OUT
(WHITE CLIP Adj) NC
NC
(MAIN EMPH Adj)
NC
SWITCHED 5V
CLAMP IN
SP (L) IN
PB CTL. IN
12 dB AMP OUT
12 dB AMP IN
PB NOISE OUT
DRUM FF IN
For IHDL DEMOD
H NOISE OUT
IHDL Y IN
Y IN
H NOISE IN
DRUM FF IN
DE-EMPH Adj
SHARPNEES CTL. IN
Y OUT
(DO PULSE OUT) NC
44
43
42
41
40 Vcc
39
38
37
36
35
34
33
32 CR
31
30
29
28
27
26
25
24
23
FREQ. MOD
W/D CLIP
MAIN EMPH.
CLAMP
NON-LIN MIX
REC
PB
NON-LIN EMPH DE-EMPH
12dB AMP
HPF
FM CAR INT. CTL
NOISE DET
NOISE LIMITER
NOISE CANCEL
AMP
DE-EMPH
SHARP -NESS CONTROL
DELAY
DOC DET
DELAY & MIX
AGC DET
SYNC SEP.
KEYED AGC
E-E
PB
PB AMP
SUB CLAMP
E-E AMP
SQUELCH
PB
E-E
Y/C MIX
NOISE CANCEL
LPF
NOISE LIMITER
FREQ. DEMOD.
LIMITER
FREQ DEMOD
DOUBLE LIMITER
IH DELAY LINE
1 NC (E-E LEVEL Adj)
2 SYNC OUT
3 VIDEO IN
4 AGC Filter
5 PB Y IN
6 5V SUB CLAMP Filter
7 SUB CLAMP OUT
GND 8
9 VIDEO OUT
10 PB COLOR IN
11 NC (LPF Adj)
12 PB NOISE IN
CR 13 For DEMOD
14 SQUELCH or PULSE (H) IN
15 IHDL DEMOD. OUT
16 DEMOD OUT
17 NC (DEMOD GAIN CTL)
GND 18
Vcc 19 PB 5V
20
21
22 PB FM IN

Farb-Modul IC 301
Color-Module IC 301


PB FM
LPF
REC COLOR
LPF
BPF
4.43MHz (Fs+H/8Fh) OSC
SECAM (H)
CH-1 CH-2
DRUM FF
VXO
NC
1
2
3
4
5
6
7
8
GND
9
10
11
12
Vcc OUT
Fs OUT
13
14
15
16
PB MAIN CONV.
MAIN CONVERTER
REC
KILLER AMP
160 Fh VCO
ID AMP
SUB CONV.
4 PHASE LOGIC
E.F.
4.43MHz (Fs) VXO
REC APC
APC SW
P1 P2 MESECAM
BURST GATE PULSE GENERATOR
ACC DET.
PB
REC
ACC VCA
PB AFC DET.
PB
REC
REC AFC DET
PB APC DET.
REC
PB
APC SW CONTROL
MESECAM H
P2 M
P1 L
PB KILLER AMP
REC/PB SW CONTROL
H REC
L PB
HALF H. KILLER
COLOR DET.
VIDEO IN
32
31
30
29
28
GND
27
26
Vcc
25
SW 5V
24
23
22
PB COLOR
21
E-E 5V
20
19
SYNC IN
18
17
B.P.F.
2H DL

Main-Schaltung
Main Schematic Diagram
0 2

Mechacon
Mechacon



0 1 POWER SUPPLY
CN3
POWER CONTROL (ON: LOW) IN
UNREG 17V OUT
UNSW 12V OUT
SWD 5V OUT
GND (MOTOR)
GND
GND
SWD 12V OUT
SWD 5V OUT
From MAIN DECK
To MAIN CN102
MODE CONTROL MOTOR
3 0 MODE CTL
CASSETTE MOTOR
1 8 CASSETTE HOUSING
CASSETTE IN DET SWITCH
1 3 END SENSOR
REC SAFETY SWITCH
Q1 PT-352V
START SENSOR
H.UP LOW
H.DOWN LOW
IN(L)
HOUSING POSITION SWITCH
UP
DOWN
(VR 3916 OSCAR)
(TR 4916 OSCAR)
1 6 IFR
IC1 LA7225
AMP
BIAS CTL
PEAK DET
W F SHAP
D4 HP-5FR2
3 1 POWER SWITCH
D5 MA165
S3 EJECT
S1 POWER SWITCH
D1 POWER SLP-981C-50
3 2 DISPLAY
To IC301
OP 1
OP 2
3 4 TIMER
3 3 OPERATION
OP CODE from IC101
TRACKING
TRACK SUB
TIMER SWITCH
S201
OFF
ON
SWD 5V
TRACKING CONTROL
From / To CN103
TRACKING CONTROL
From / to IC401
TIMER SW ON(L)
OP1(MODE SYMBOL DATA)
OP2(CLOCK FOR DATA)
DATA 0
DATA ENABLE
COUNT UP(L) / DOWN CTL
COUNT PULSE
0 2 MAIN
MECHACON
CN602
CN606
CN609
CN601
IC602 BA6238A
LOGIC
Q602 2SD638R,S
D604 RD5.6ES-T1B3
RA602 4.7K X 3
Q605 DTA144EF
Q603 2SD637R,S
Q604 2SD880Y,GR-102
D615 RD8.2ES-T1B2
D628 1S2473
IC601 M50730-610SP
START SENS(L)
END SENS(L)
REC SAFETY
CASS IN(L)
HOUSING DOWN
HOUSING UP
LOADING SENS 2
LOADING SENS 1
CASS & MODE MOTOR CONTROL
NC
UL-2
UL-1
FF/REW/STILL
CAPSTAN SERVO ON
CAP MOTOR FWD/REV(L) CTL
COUNT UP(L)/DOWN CTL
STROBE DATA
DATA I/O
Vcc
Vss
CLOCK OSC
CLOCK
RESET(L)
OPERATION CODE
TIMER SWITCH(L)
REMOTE (CAMERA) PAUSE (L)
CAPSTAN FG
POWER ON/OFF SWITCH
TUNER(L)
TAKE-UP REEL FG
OP 1
OP 2
CAPSTAN MOTOR CONTROL
MODE 2
DRUM FLIP-FLOP
MOTOR START
SEARCH
V PULSE ON/OFF(L) CTL
MODE 1
PLAY BACK(L)
MUTING
POWER ON(L)/OFF CTL
CF601 4MHz
TP 602
Q601 DTC124EF
RA601 3.3K X 4
SWD 5V
UNSW 12V
OP CODE
POWER ON/OFF CTL
POWER CTL(ON: LOW)
UNREG 17 V
LOADING SENS 2
LOADING SENS 1
UNSW 5V
UNSW 12V
UNREG 17V
UNSW 5V
CAP MOTOR DIRVE
CAP FWD/REV(L)CTL
TAKE-UP REEL FG
LOADING SENS 2
LOADING SENS 1
SWD 12V
TP306 fsc
D623 RD12ES-T1B3
TP423 CF-V PWM
TP425 CPD PWM
TP 420 DRUM PHASE ERROR
Q403 2SB641R,S
Q404 2SD636R,S
D408 RD5.1 ES-T1B3
D403 MA165
D404 MA165
D405 MA165
D406 MA165
D407 MA165
TP422 CAPSTAN PHASE ERROR
NORI SEARCH
CAPSTAN SPEED DET
S&H
REC
PB
TRAPE
ASS'Y
CAP PHASE DET
STOP (L)
STILL (M)
START (H)
RECBASSY
REW/FWD
REMOTE PAUSE (0)
INPUT SEL(TUNER: L)
MODE 2 (REC: L)
V PULSE ON: H
MODE 1 (REC: L)
PLAY BACK : L
MUTING : H
UNSW 12V
SW 12V
From / To VIDEO / AUDIO SECTION
From / To VIDEO/AUDIO SECTION
①
②
③
④
⑯

MODE \ PIN NO	(41)	(42)	(43)	(44)	(45)
STOP	L	L	L	L	H/L
SERVO ON	L	L	L	H	H
FF / REW	H	L	H	L	H/L

H: HIGH IMPEDANCE

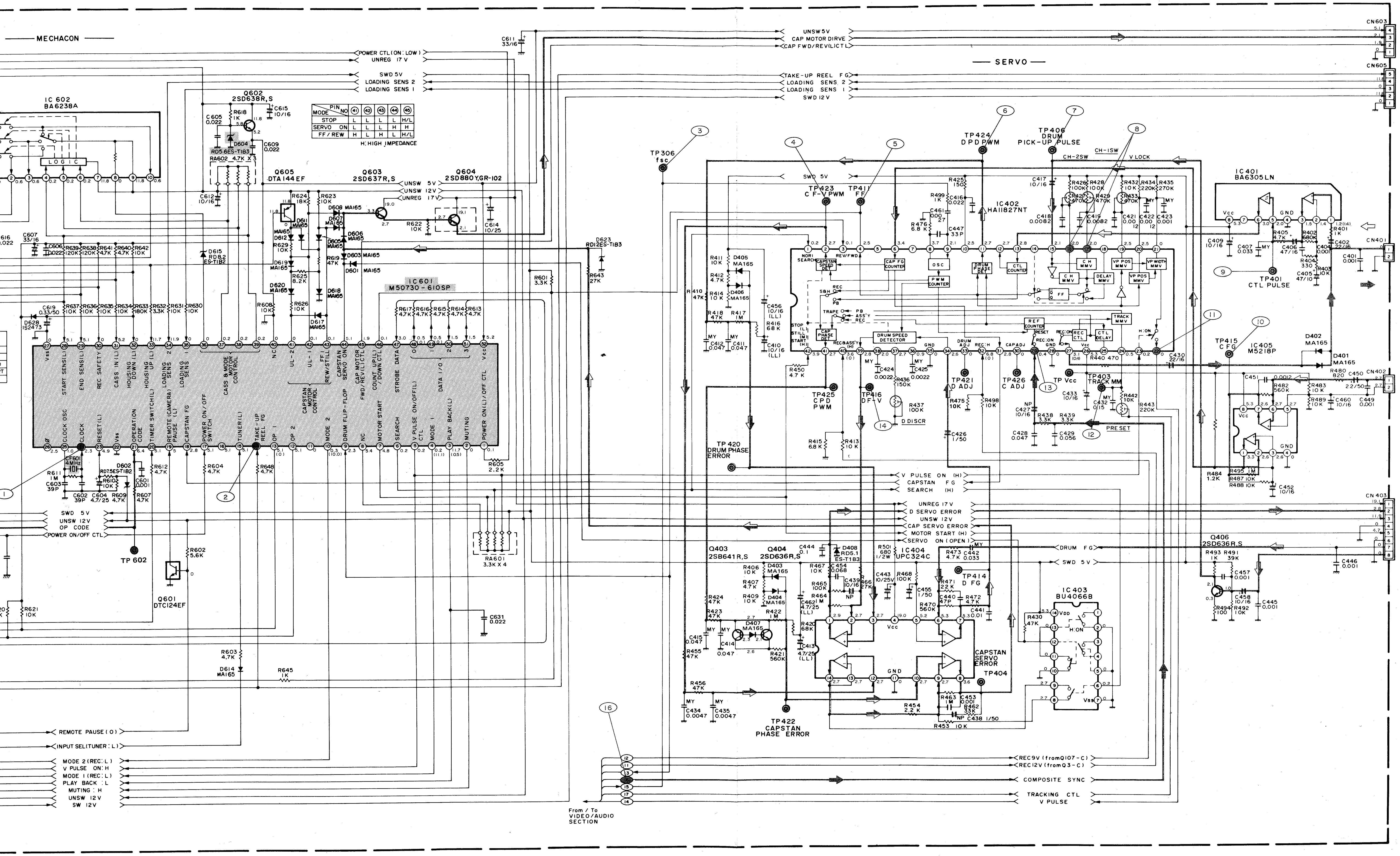
IC602
I/O TABLE

IN PUT ④	⑤	⑥	OUT PUT ⑩	②	③	MODE
L	L	L/H	L	L	L	BRAKE
H	L	L	H	L	O	LOAD
H	L	H	L	H	O	UNLOAD
L	H	L	H	O	L	C INSERT
L	H	H	L	O	H	EJECT

O: OPEN

Main-Schaltung
Main Schematic Diagram
0 2

Servo
Servo

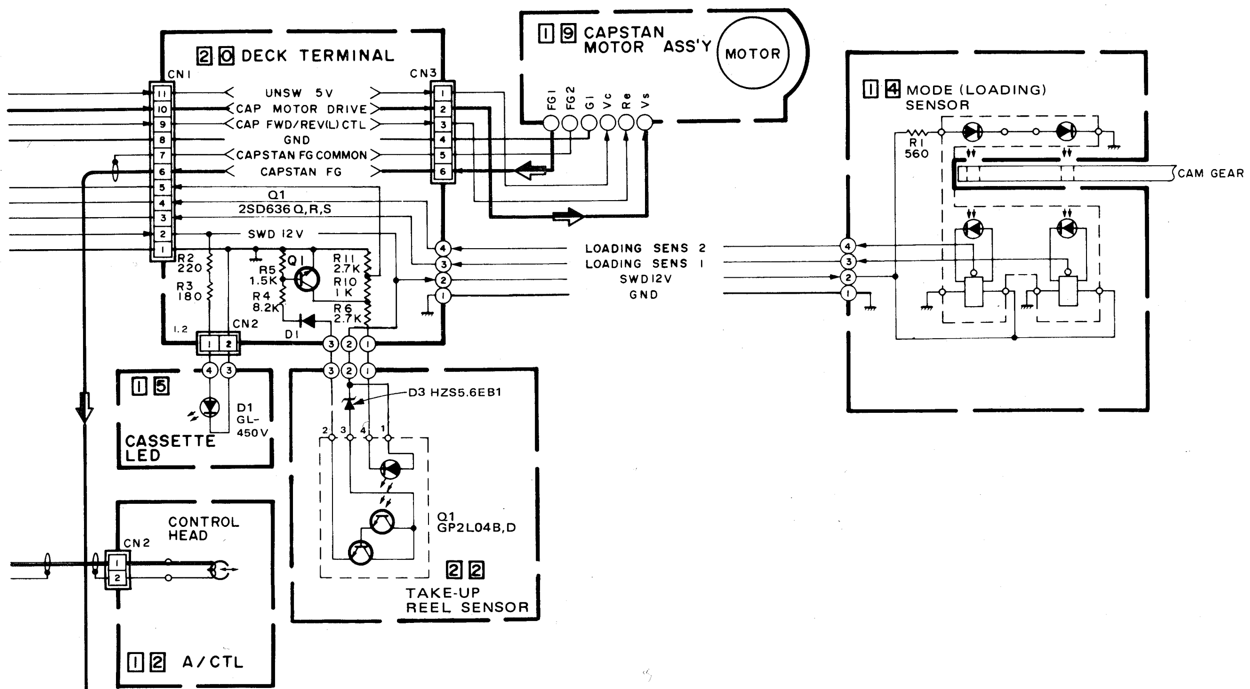


MECHACON
SERVO
IC 602
BA6238A
LOGIC
Q602
2SD638R,S
Q605
DTA144EF
Q603
2SD637R,S
Q604
2SD880Y,GR-102
IC601
M50730-610SP
Q601
DTC124EF
TP 602
POWER CTL (ON: LOW)
UNREG 17 V
SWD 5V
LOADING SENS 2
LOADING SENS 1
UNSW 5V
UNSW 12V
UNREG 17V
UNSW5V
CAP MOTOR DIRVE
CAP FWD/REV/LICTL
TAKE-UP REEL FG
SWD 12V
CN603
CN605
CN401
CN402
CN403
IC401
BA6305LN
IC402
HA11827NT
IC403
BU4066B
IC404
UPC324C
IC405
M5218P
Q403
2SB641R,S
Q404
2SD636R,S
Q406
2SD636R,S
TP306
fsc
TP423
C F-V PWM
TP411
F F
TP424
D P D PWM
TP406
DRUM
PICK-UP PULSE
TP401
CTL PULSE
TP415
C FG
TP420
DRUM PHASE
ERROR
TP425
C P D
PWM
TP416
DF-V
TP421
D ADJ
TP426
C ADJ
TP403
TRACK MM
TP Vcc
TP414
D FG
TP404
CAPSTAN
SERVO
ERROR
TP422
CAPSTAN
PHASE ERROR
D DISCR
PRE SET
CH-2SW
CH-1SW
V LOCK
V PULSE ON (H)
CAPSTAN FG
SEARCH (H)
UNREG 17V
D SERVO ERROR
UNSW 12V
CAP SERVO ERROR
MOTOR START (H)
SERVO ON (OPEN)
DRUM FG
SWD 5V
REMOTE PAUSE (0)
INPUT SEL (TUNER: L)
MODE 2 (REC: L)
V PULSE ON: H
MODE 1 (REC: L)
PLAY BACK: L
MUTING: H
UNSW 12V
SW 12V
SWD 5V
UNSW 12V
OP CODE
POWER ON/OFF CTL
REC9V (from Q107-C)
REC12V (from Q3-C)
COMPOSITE SYNC
TRACKING CTL
V PULSE
From / To
VIDEO/AUDIO
SECTION
START SENS (L)
END SENS (L)
REC SAFETY
CASS IN (L)
HOUSING DOWN (L)
HOUSING UP (L)
LOADING SENS 2
LOADING SENS 1
CASS & MODE MOTOR CONTROL
UL-2
UL-1
FF/REW/STILL
CAPSTAN SERVO ON
CAP MOTOR FWD/REV (L) CTL
COUNT UP (L) / DOWN CTL
STROBE DATA
DATA I/O
Vcc
CLOCK OSC
CLOCK
RESET (L)
Vss
OPERATION CODE
TIMER SWITCH (L)
REMOTE (CAMERA) PAUSE (L)
CAPSTAN FG
POWER ON/OFF SWITCH
TUNER (L)
TAKE-UP REEL FG
OP 1
OP 2
MODE 2
DRUM FLIP-FLOP
NC
MOTOR START
SEARCH
V PULSE ON/OFF (L) CTL
MODE 1
PLAY BACK (L)
MUTING
POWER ON (L)/OFF CTL
CAPSTAN MOTOR CONTROL
CAPSTAN SPEED DET
CAP FG COUNTER
OSC
PWM COUNTER
DRUM PHASE DET
CTL COUNTER
CAP PHASE DET
DRUM SPEED DETECTOR
REF COUNTER
CH MMV
DELAY MMV
VP POS MMV
VP WIDTH MMV
REC CTL
CTL DELAY
TRACK MMV
FF
NORI SEARCH
REW/FWD
STOP (L)
STILL (M)
START (H)
REC
SBH
PB
TRAPE
ASS'Y
REC BASS'Y (H)
DRUM ADJ
REC H
CAP ADJ
GND
H:ON
RA601
3.3K X 4
RA602 4.7K X 3
CF601
4MHz

MODE \ PIN NO	㊶	㊷	㊸	㊹	㊺
STOP	L	L	L	L	H/L
SERVO ON	L	L	L	H	H
FF / REW	H	L	H	L	H/L

H: HIGH IMPEDANCE

Main-Schaltung
Main Schematic Diagram
02

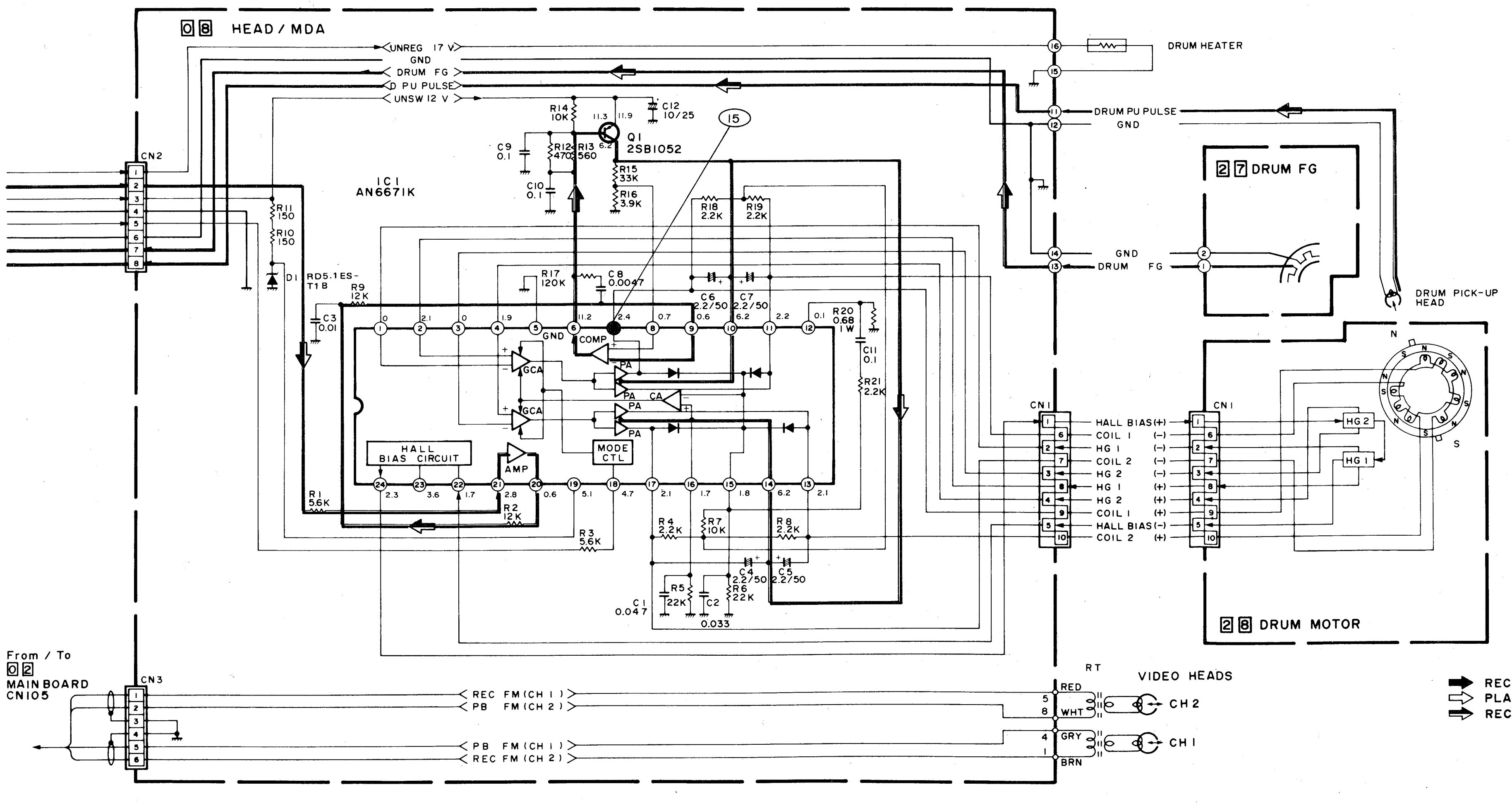

20 DECK TERMINAL
UNSW 5V
CAP MOTOR DRIVE
CAP FWD/REV(L)CTL
GND
CAPSTAN FG COMMON
CAPSTAN FG
Q1 2SD636Q,R,S
SWD 12V
19 CAPSTAN MOTOR ASS'Y
MOTOR
14 MODE (LOADING) SENSOR
CAM GEAR
LOADING SENS 2
LOADING SENS 1
SWD12V
GND
15 CASSETTE LED
D1 GL-450V
D3 HZS5.6EB1
Q1 GP2L04B,D
22 TAKE-UP REEL SENSOR
CONTROL HEAD
12 A/CTL

Voltages are DC-measured with a digital voltmeter during recording mode. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.

MDA
MDA

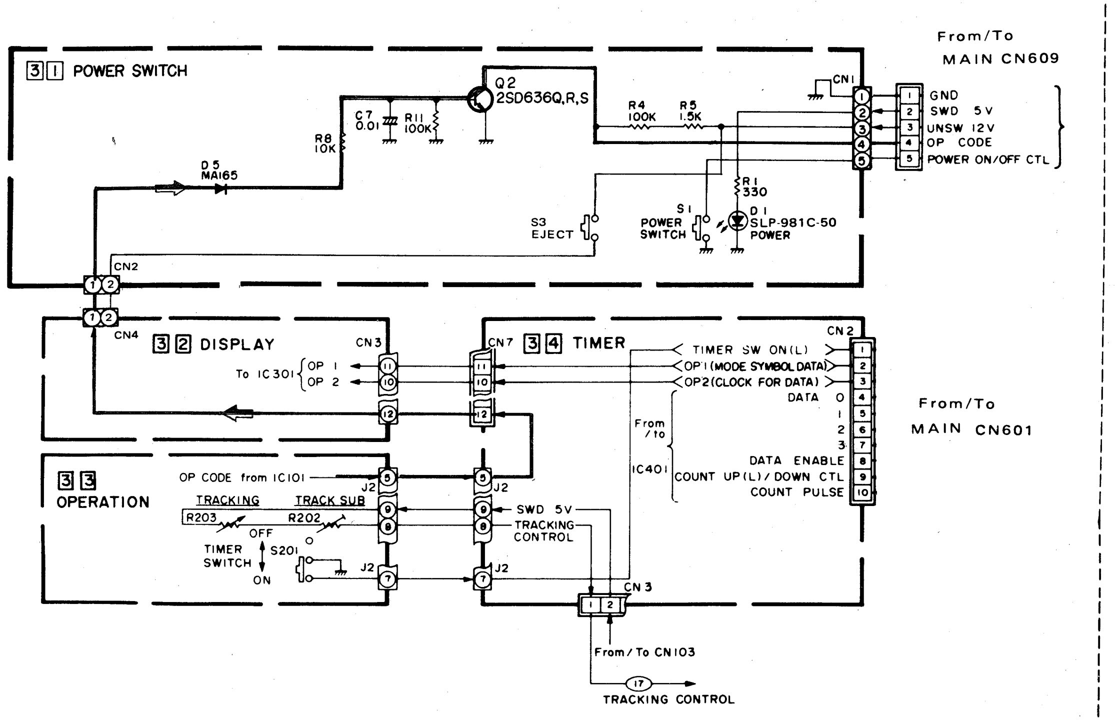
Die Gleichspannungen sind im Aufnahmebetrieb mit einem Digitalvoltmeter gemessen. Die Spannungen für Wiedergabe stehen in Klammern.

▨ Grau unterlegte Bauteile sind Sicherheitsbauteile und dürfen nur gegen die Original-Ersatzteile ausgewechselt werden!

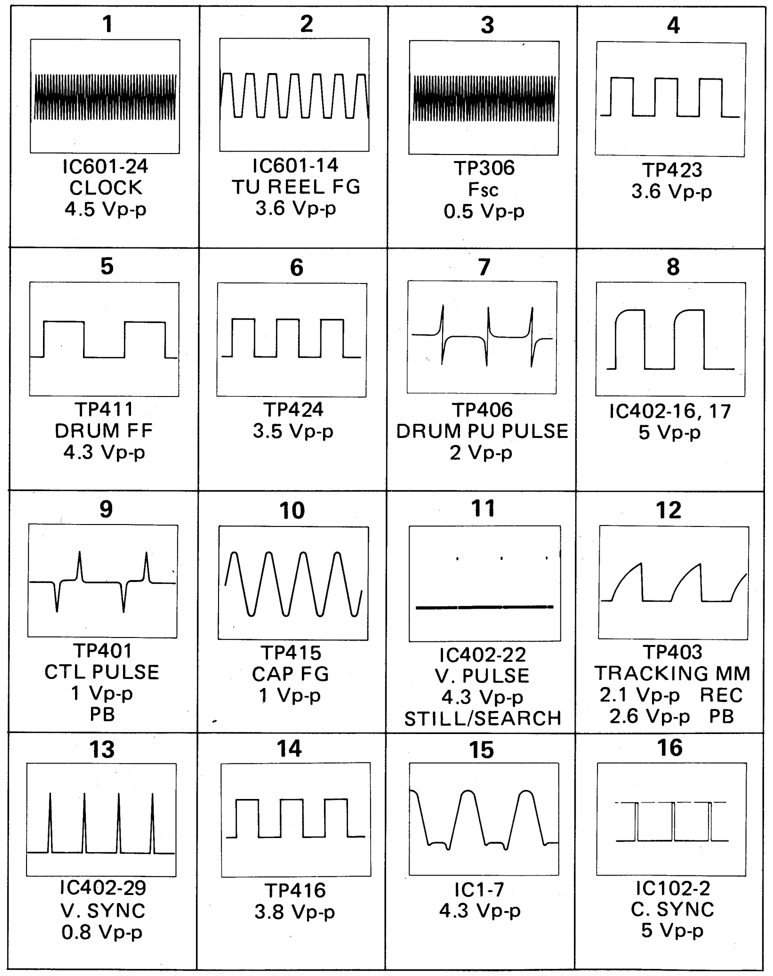

08 HEAD / MDA
UNREG 17 V
GND
DRUM FG
D PU PULSE
UNSW 12 V
DRUM HEATER
DRUM PU PULSE
GND
IC1 AN6671K
Q1 2SB1052
HALL BIAS CIRCUIT
MODE CTL
COMP
GCA
PA
AMP
27 DRUM FG
DRUM PICK-UP HEAD
HALL BIAS(+)
COIL 1 (−)
HG 1 (−)
COIL 2 (−)
HG 2 (−)
HG 1 (+)
HG 2 (+)
COIL 1 (+)
HALL BIAS(−)
COIL 2 (+)
HG 1
HG 2
28 DRUM MOTOR
From / To 02 MAIN BOARD CN105
REC FM (CH 1)
PB FM (CH 2)
PB FM (CH 1)
REC FM (CH 2)
VIDEO HEADS
CH 2
CH 1

➡ RECORDING SIGNAL PATH
⇨ PLAYBACK SIGNAL PATH
⇛ REC/PLAY SIGNAL PATH

(VR 3906 OSCAR)
(TR 4906 OSCAR)


31 POWER SWITCH
Q2 2SD636Q,R,S
From/To MAIN CN609
GND
SWD 5V
UNSW 12V
OP CODE
POWER ON/OFF CTL
S3 EJECT
S1 POWER SWITCH
D1 SLP-981C-50 POWER
32 DISPLAY
34 TIMER
TIMER SW ON(L)
OP1 (MODE SYMBOL DATA)
OP2 (CLOCK FOR DATA)
DATA
DATA ENABLE
COUNT UP(L)/DOWN CTL
COUNT PULSE
From/To MAIN CN601
33 OPERATION
OP CODE from IC101
TRACKING
TRACK SUB
TIMER SWITCH
SWD 5V
TRACKING CONTROL
From/To CN103
TRACKING CONTROL

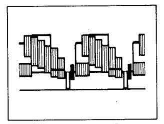
Oszillogramme der Mechacon / Servo Schaltung
Waveforms of Mechacon / Servo circuit

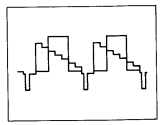

1
IC601-24 CLOCK 4.5 Vp-p
2
IC601-14 TU REEL FG 3.6 Vp-p
3
TP306 Fsc 0.5 Vp-p
4
TP423 3.6 Vp-p
5
TP411 DRUM FF 4.3 Vp-p
6
TP424 3.5 Vp-p
7
TP406 DRUM PU PULSE 2 Vp-p
8
IC402-16, 17 5 Vp-p
9
TP401 CTL PULSE 1 Vp-p PB
10
TP415 CAP FG 1 Vp-p
11
IC402-22 V. PULSE 4.3 Vp-p STILL/SEARCH
12
TP403 TRACKING MM 2.1 Vp-p REC 2.6 Vp-p PB
13
IC402-29 V. SYNC 0.8 Vp-p
14
TP416 3.8 Vp-p
15
IC1-7 4.3 Vp-p
16
IC102-2 C. SYNC 5 Vp-p

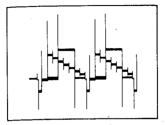
Main-Schaltung Video
Main Schematic Diagram Video

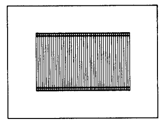
02

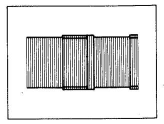
Oszillogramme der Audio / Video Schaltung
Waveforms of Audio / Video circuit

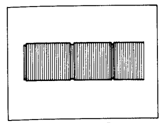
1

IC102-3
VIDEO IN
1 Vp-p

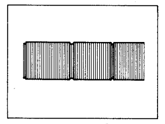
2

IC102-35
Y. SIGNAL
0.28 Vp-p

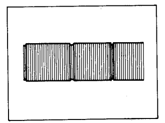
3

IC102-41
EMPHASIS
0.7 Vp-p
E-E

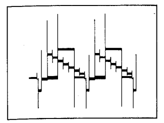
4

IC102-44
FM
0.9 Vp-p
E-E

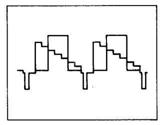
5

TP122
REC FM
0.15 Vp-p
REC

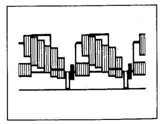
6

TP126
PB FM
0.4 Vp-p
PB

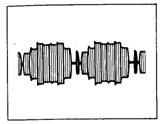
7

TP106
0.07 Vp-p
PB

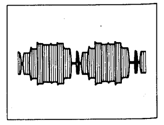
8

IC101-19, IC102-22
PB FM
0.3 Vp-p
PB

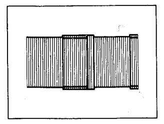
9

IC102-16
DEMOD OUT
0.5 Vp-p
PB

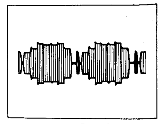
10

IC102-24
PB Y
0.23 Vp-p
PB

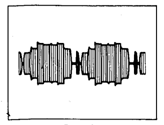
11

TP110
VIDEO OUT
1 Vp-p

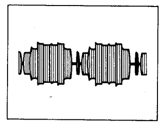
12

IC301-29
COLOR SIG
0.38 Vp-p (REC)
0.15 Vp-p (PB)

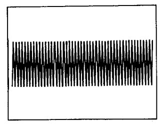
13

IC301-5
0.8 Vp-p
E-E

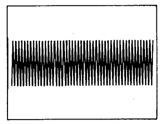
14

IC101-3
REC FM
3.5 Vp-p
REC

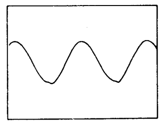
15

TP304
PB COLOR
0.2 Vp-p
PB

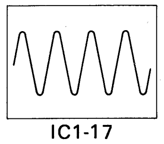
16

Q304-B
D.L. OUT
0.1 Vp-p

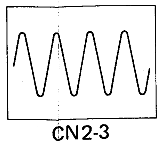
17

IC102-10
0.4 Vp-p
PB

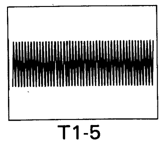
18

IC301-10
0.35 Vp-p
(4.43 MHz)

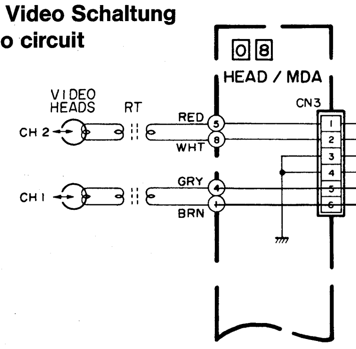
19

TP306
Fsc
0.5 Vp-p

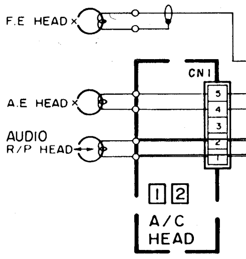
20

TP310
SECAM DET
3.5 Vp-p
SECAM

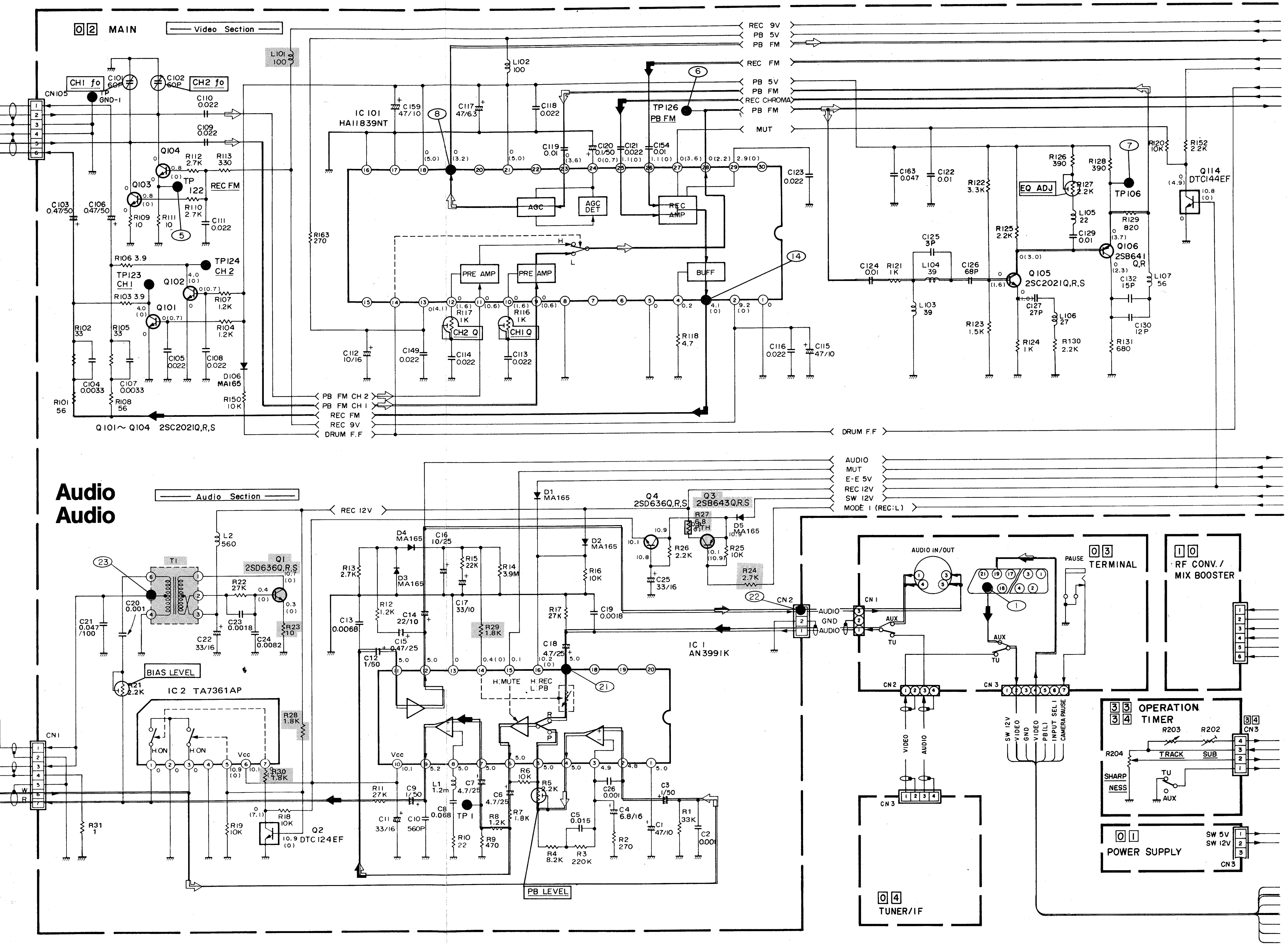
21

IC1-17
AUDIO IN
−27 dBs 1 kHz

22

CN2-3
AUDIO OUT
−1 dBs 1 kHz

23

T1-5
BIAS OSC
30 Vp-p
REC


08
HEAD / MDA
VIDEO HEADS
RT
CH 2
CH 1
RED
WHT
GRY
BRN
CN3


F.E HEAD
A.E HEAD
AUDIO R/P HEAD
CN1
12
A/C HEAD

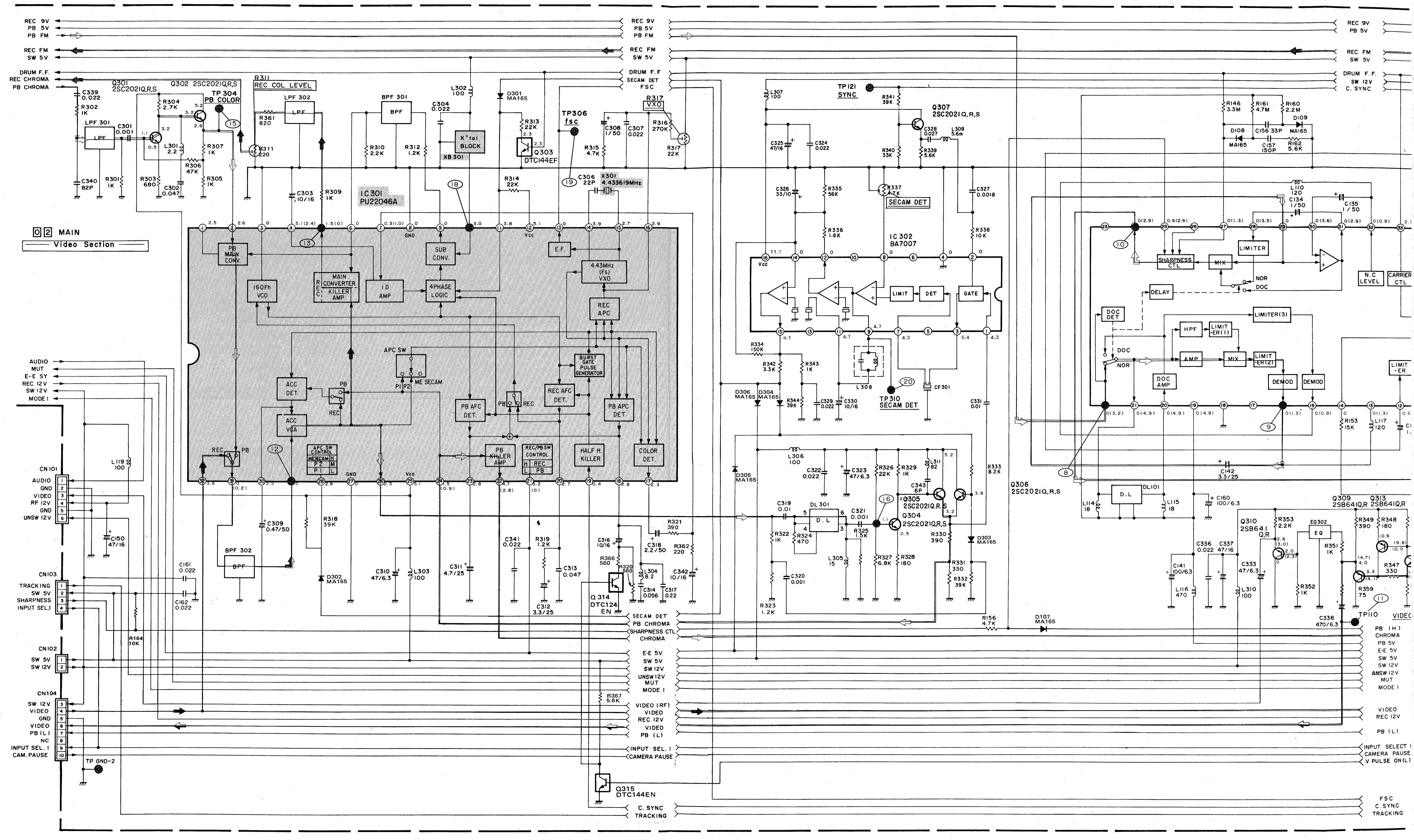

02 MAIN
Video Section
CN105
CH1 fo
CH2 fo
TP GND-1
Q101~Q104 2SC2021Q,R,S
Q101
Q102
Q103
Q104
TP122
REC FM
TP123 CH1
TP124 CH2
IC101
HA11839NT
AGC
AGC DET
REC AMP
PRE AMP
PRE AMP
BUFF
CH2 Q
CH1 Q
TP126
PB FM
TP106
EQ ADJ
Q105 2SC2021Q,R,S
Q106 2SB641Q,R
Q114 DTC144EF
REC 9V
PB 5V
PB FM
REC FM
PB 5V
PB FM
REC CHROMA
PB FM
MUT
PB FM CH 2
PB FM CH 1
REC FM
REC 9V
DRUM F.F
DRUM F.F
Audio
Audio
Audio Section
REC 12V
T1
Q1 2SD636Q,R,S
BIAS LEVEL
IC2 TA7361AP
H:ON
H:ON
Q2 DTC124EF
Q3 2SB643Q,R,S
Q4 2SD636Q,R,S
D1 MA165
D2 MA165
D3 MA165
D4 MA165
D5 MA165
IC1 AN3991K
H:MUTE
H:REC
L:PB
TP1
PB LEVEL
AUDIO
MUT
E-E 5V
REC 12V
SW 12V
MODE 1 (REC:L)
AUDIO
GND
AUDIO
CN2
03 TERMINAL
AUDIO IN/OUT
PAUSE
CN1
AUX
TU
CN2
CN3
VIDEO
AUDIO
SW 12V
VIDEO
GND
VIDEO
PB(L)
INPUT SEL
CAMERA PAUSE
10
RF CONV. / MIX BOOSTER
33 34 OPERATION TIMER
CN3
R203
R202
R204
TRACK
SUB
SHARP NESS
TU
AUX
01 POWER SUPPLY
SW 5V
SW 12V
CN3
CN3
04 TUNER/IF

➡ RECORDING SIGNAL PATH
⇨ PLAYBACK SIGNAL PATH
⇨ REC/PLAY SIGNAL PATH

NOTE: Unless otherwise specified.
1. All resistance values are in ohms. (1/6 W)
2. All inductance values are in μH.
3. All capacitance values are in μF.
4. Voltages are DC-measured with a digital voltmeter during recording mode.
5. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.

Die Gleichspannungen sind im Aufnahmebetrieb mit einem Digitalvoltmeter gemessen.
Die Spannungen für Wiedergabe stehen in Klammern.
▨ Grau unterlegte Bauteile sind Sicherheitsbauteile und dürfen nur gegen die Original-Ersatzteile ausgewechselt werden!

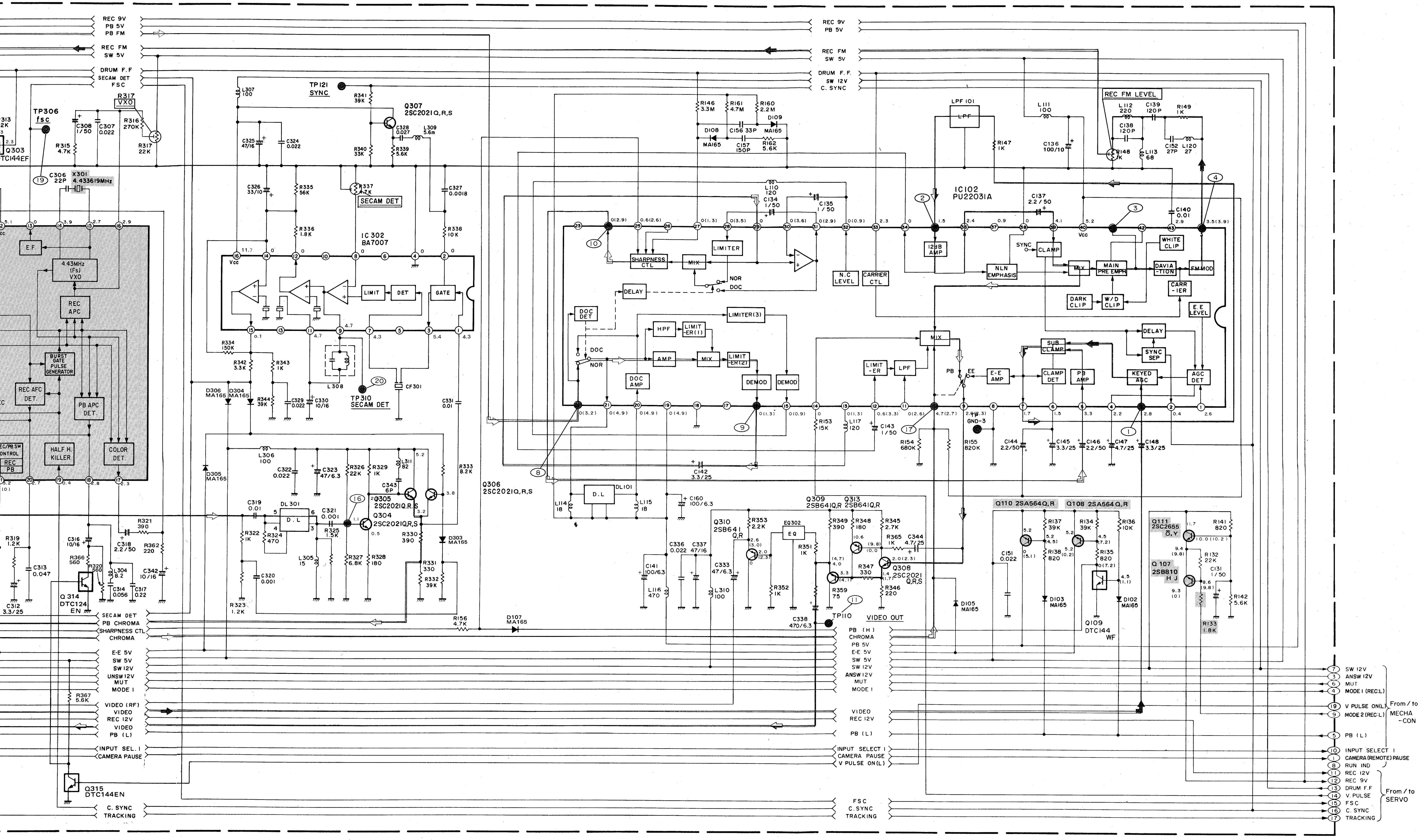
Main Schaltung
Main Schematic Diagram
02



02 MAIN
Video Section
REC 9V
PB 5V
PB FM
REC FM
SW 5V
DRUM F.F.
REC CHROMA
PB CHROMA
SECAM DET
FSC
DRUM F.F.
SW 12V
C. SYNC
Q301 2SC2021Q,R,S
Q302 2SC2021Q,R,S
TP304 PB COLOR
R311 REC COL LEVEL
LPF 301
LPF 302
BPF 301
L302 100
C304 0.022
X'tal BLOCK
XB301
D301 MA165
R313 22K
Q303 DTC144EF
TP306 fsc
R317 VXO
R316 270K
R317 22K
C308 1/50
C307 0.022
R315 4.7K
C306 22P
X301 4.433619MHz
R314 22K
IC301 PU2204 6A
C339 0.022
R302 1K
C301 0.001
R304 2.7K
L301 2.2
R306 47K
R307 1K
R305 1K
R303 680
C302 0.047
C340 82P
R301 1K
R361 820
C303 10/16
R309 1K
R310 2.2K
R312 1.2K
PB MAIN CONV.
160Fh VCO
MAIN CONVERTER KILLER AMP
ID AMP
SUB CONV.
4PHASE LOGIC
E.F.
4.43MHz (Fs) VXO
REC APC
APC SW
ME SECAM
BURST GATE PULSE GENERATOR
ACC DET.
ACC VCA
PB AFC DET.
REC AFC DET.
PB APC DET.
APC SW CONTROL
MESECAM H
PAL L
PB KILLER AMP
REC/PB SW CONTROL
HALF H. KILLER
COLOR DET.
GND
Vcc
AUDIO
MUT
E-E SY
REC 12V
SW 12V
MODE1
CN101
AUDIO
GND
VIDEO
RF 12V
GND
UNSW 12V
L119 100
C150 47/16
CN103
TRACKING
SW 5V
SHARPNESS
INPUT SEL.I
C161 0.022
C162 0.022
R164 10K
CN102
SW 5V
SW 12V
CN104
SW 12V
VIDEO
GND
VIDEO
PB(L)
NC
INPUT SEL. I
CAM. PAUSE
TP GND-2
C309 0.47/50
R318 39K
BPF 302
D302 MA165
C310 47/6.3
L303 100
C311 4.7/25
C341 0.022
R319 1.2K
C312 3.3/25
C313 0.047
C316 10/16
R366 560
R320 560
Q314 DTC124EN
C318 2.2/50
R321 390
R362 220
L304 8.2
C314 0.056
C317 0.22
C342 10/16
SECAM DET
PB CHROMA
SHARPNESS CTL
CHROMA
E-E 5V
SW 5V
SW 12V
UNSW 12V
MUT
MODE I
R367 5.6K
VIDEO (RF)
VIDEO
REC 12V
VIDEO
PB (L)
INPUT SEL. I
CAMERA PAUSE
Q315 DTC144EN
C. SYNC
TRACKING
L307 100
TP121 SYNC
R341 39K
Q307 2SC2021Q,R,S
C328 0.027
L309 5.6m
R340 33K
R339 5.6K
C325 47/16
C324 0.022
C326 33/10
R335 56K
R337 47K
SECAM DET
C327 0.0018
R336 1.8K
IC302 BA7007
R338 10K
LIMIT
DET
GATE
R334 150K
R342 3.3K
R343 1K
L308
D306 MA165
D304 MA165
R344 39K
C329 0.022
C330 10/16
TP310 SECAM DET
CF301
C331 0.01
L306 100
C322 0.022
C323 47/6.3
R326 22K
R329 1K
L311 82
C343 6P
Q305 2SC2021Q,R,S
Q304 2SC2021Q,R,S
R333 8.2K
D305 MA165
C319 0.01
DL301
D.L
C321 0.001
R322 1K
R324 470
R325 1.5K
R330 390
D303 MA165
L305 15
R327 6.8K
R328 180
R331 330
R332 39K
C320 0.001
R323 1.2K
R156 4.7K
D107 MA165
Q306 2SC2021Q,R,S
R146 3.3M
R161 4.7M
R160 2.2M
D109
D108
C156 33P
MA165
MA165
C157 150P
R162 5.6K
L110 120
C134 1/50
C135 1/50
SHARPNESS CTL
MIX
LIMITER
NOR
DOC
DELAY
N.C LEVEL
CARRIER CTL
DOC DET
LIMITER(3)
HPF
LIMIT -ER(1)
AMP
MIX
LIMIT -ER(2)
DOC AMP
DEMOD
DEMOD
LIMIT -ER
R153 15K
L117 120
C142 3.3/25
D.L
DL101
L114 18
L115 18
C160 100/6.3
Q309 2SB641Q,R
Q313 2SB641Q,R
Q310 2SB641Q,R
R353 2.2K
EQ302
EQ
R349 390
R348 180
R351 1K
C141 100/63
C336 0.022
C337 47/16
C333 47/6.3
L310 100
L116 470
R352 1K
R347 330
R359 75
C338 470/6.3
TP110
VIDEO
PB (H)
CHROMA
PB 5V
E-E 5V
SW 5V
SW 12V
ANSW 12V
MUT
MODE I
VIDEO
REC 12V
PB (L)
INPUT SELECT I
CAMERA PAUSE
V PULSE ON(L)
FSC
C.SYNC
TRACKING
REC 9V
PB 5V
REC FM
SW 5V

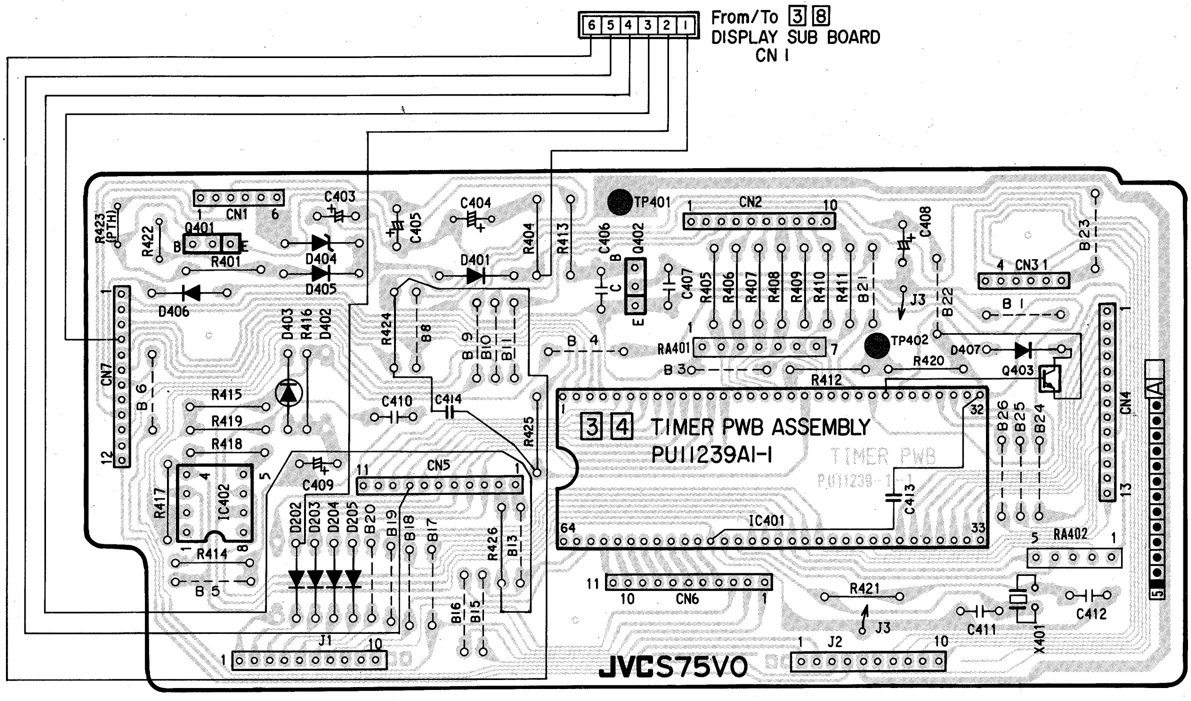
Main Schaltung
Main Schematic Diagram

0 2


REC 9V
PB 5V
PB FM
REC FM
SW 5V
DRUM F.F
SECAM DET
FSC
SW 12V
C. SYNC
TP306
fsc
R317
VXO
R316 270K
R317 22K
C308 1/50
C307 0.022
R315 4.7K
Q303
DTC144EF
C306 22P
X301 4.433619MHz
E.F.
4.43MHz (Fs) VXO
REC APC
BURST GATE PULSE GENERATOR
REC AFC DET.
PB APC DET.
HALF H. KILLER
COLOR DET.
REC/PB SW CONTROL
REC
PB
L307 100
TP121 SYNC
R341 39K
Q307 2SC2021Q,R,S
C328 0.027
L309 5.6m
R340 33K
R339 5.6K
C325 47/16
C324 0.022
C326 33/10
R335 56K
R337 4.7K
SECAM DET
C327 0.0018
R336 1.8K
IC302 BA7007
R338 10K
LIMIT
DET
GATE
R334 150K
R342 3.3K
R343 1K
L308
TP310 SECAM DET
CF301
D306 MA165
D304 MA165
R344 39K
C329 0.022
C330 10/16
C331 0.01
R333 8.2K
D305 MA165
L306 100
C322 0.022
C323 47/6.3
R326 22K
R329 1K
L311 82
C343 6P
Q305 2SC2021Q,R,S
Q304 2SC2021Q,R,S
C319 0.01
DL301
D.L
C321 0.001
R325 1.5K
R322 1K
R324 470
R330 390
D303 MA165
L305 15
R327 6.8K
R328 180
R331 330
R332 39K
C320 0.001
R323 1.2K
R321 390
R319 1.2K
C316 10/16
C318 2.2/50
R362 220
R366 560
R320 560
L304 8.2
C342 10/16
C313 0.047
C314 0.056
C317 0.22
C312 3.3/25
Q314 DTC124EN
Q306 2SC2021Q,R,S
R156 4.7K
D107 MA165
R367 5.6K
Q315 DTC144EN
PB CHROMA
SHARPNESS CTL
CHROMA
E-E 5V
UNSW 12V
MUT
MODE 1
VIDEO (RF)
VIDEO
REC 12V
PB (L)
INPUT SEL. 1
CAMERA PAUSE
TRACKING
R146 3.3M
R161 4.7M
R160 2.2M
D109
D108 MA165
C156 33P
MA165
C157 150P
R162 5.6K
L110 120
C134 1/50
C135 1/50
IC102 PU2203IA
LPF 101
LPF
R147 1K
L111 100
C136 100/10
REC FM LEVEL
L112 220
C139 120P
R149 1K
C138 120P
R148 1K
L113 68
C152 27P
L120 27
C137 2.2/50
C140 0.01
SHARPNESS CTL
MIX
LIMITER
NOR
DOC
DELAY
DOC DET
N.C LEVEL
CARRIER CTL
12dB AMP
NLN EMPHASIS
SYNC
CLAMP
MAIN PRE EMPH
DAVIA -TION
FM MOD
WHITE CLIP
DARK CLIP
W/D CLIP
CARR -IER
E E LEVEL
HPF
LIMIT -ER(1)
LIMITER(3)
AMP
LIMIT -ER(2)
DEMOD
DOC AMP
LIMIT -ER
SUB CLAMP
SYNC SEP
CLAMP DET
PB AMP
KEYED AGC
AGC DET
E-E AMP
PB
EE
Vcc
R153 15K
L117 120
C143 1/50
R154 680K
R155 820K
GND-3
C144 2.2/50
C145 3.3/25
C146 22/50
C147 4.7/25
C148 3.3/25
C142 3.3/25
DL101
L114 18
L115 18
C160 100/6.3
Q309 2SB641Q,R
Q313 2SB641Q,R
Q310 2SB641 Q,R
R353 2.2K
EQ302
EQ
R349 390
R348 180
R345 2.7K
R365 1K
C344 4.7/25
R351 1K
C336 0.022
C337 47/16
C141 100/63
L116 470
C333 47/6.3
L310 100
R352 1K
R347 330
Q308 2SC2021 Q,R,S
R346 220
R359 75
C338 470/6.3
TP110
VIDEO OUT
D105 MA165
Q110 2SA564Q,R
Q108 2SA564Q,R
R137 39K
R134 39K
R136 10K
C151 0.022
R138 820
R135 820
D103 MA165
D102 MA165
Q109 DTC144 WF
Q111 2SC2655 O,Y
R141 820
R132 22K
Q107 2SB810 H J
C131 1/50
R142 5.6K
R133 1.8K
PB (H)
ANSW 12V
V PULSE ON(L)
MODE 2 (REC:L)
INPUT SELECT 1
CAMERA PAUSE
RUN IND
V. PULSE
From / to MECHA -CON
From / to SERVO

Timer-Platte
Timer Circuit Board

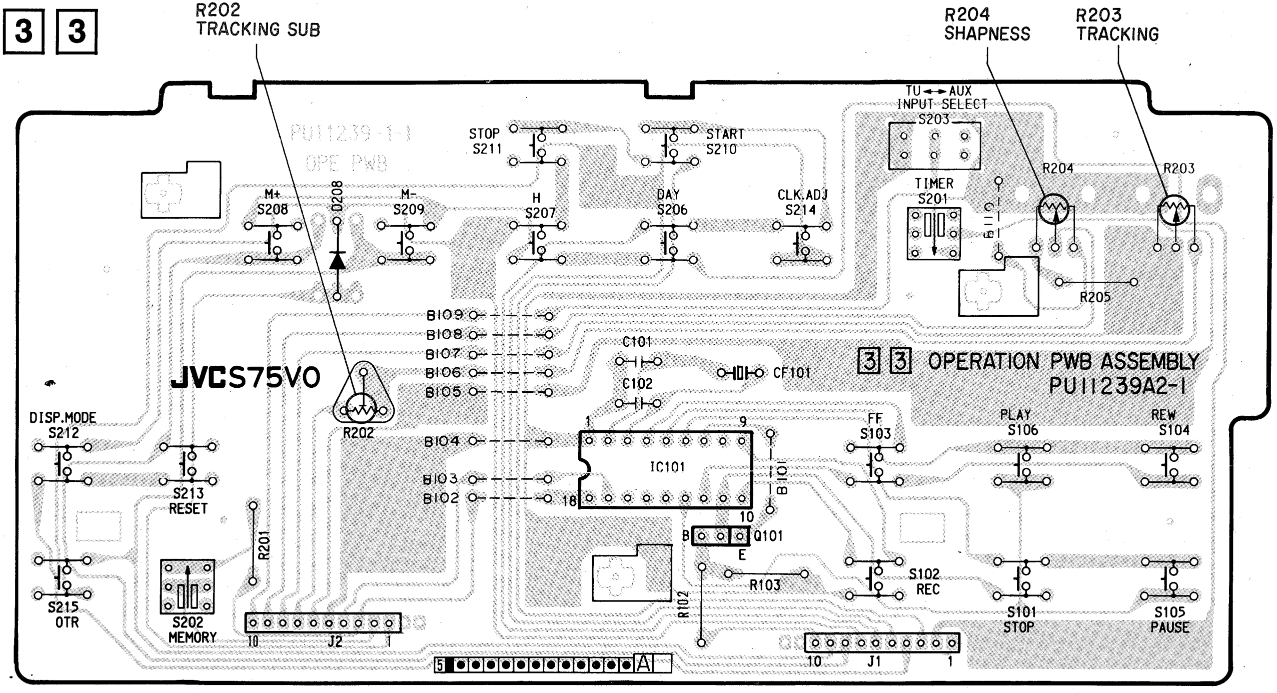
3 4



From/To 3 8
DISPLAY SUB BOARD
CN 1
6 5 4 3 2 1
3 4 TIMER PWB ASSEMBLY
PU11239A1-1
TIMER PWB
PU11239-1-1
IC401
IC402
CN1
CN2
CN3
CN4
CN5
CN6
CN7
J1
J2
J3
TP401
TP402
Q401
Q402
Q403
D401
D402
D403
D404
D405
D406
D407
D202
D203
D204
D205
C403
C404
C405
C406
C407
C408
C409
C410
C411
C412
C413
C414
R401
R404
R405
R406
R407
R408
R409
R410
R411
R412
R413
R414
R415
R416
R417
R418
R419
R420
R421
R422
R423 (PTH)
R424
R425
R426
RA401
RA402
X401
B1
B3
B4
B5
B6
B8
B9
B10
B11
B13
B15
B16
B17
B18
B19
B20
B21
B22
B23
B24
B25
B26
JVC S75VO

Bedienteil-Platte
Operation Circuit Board

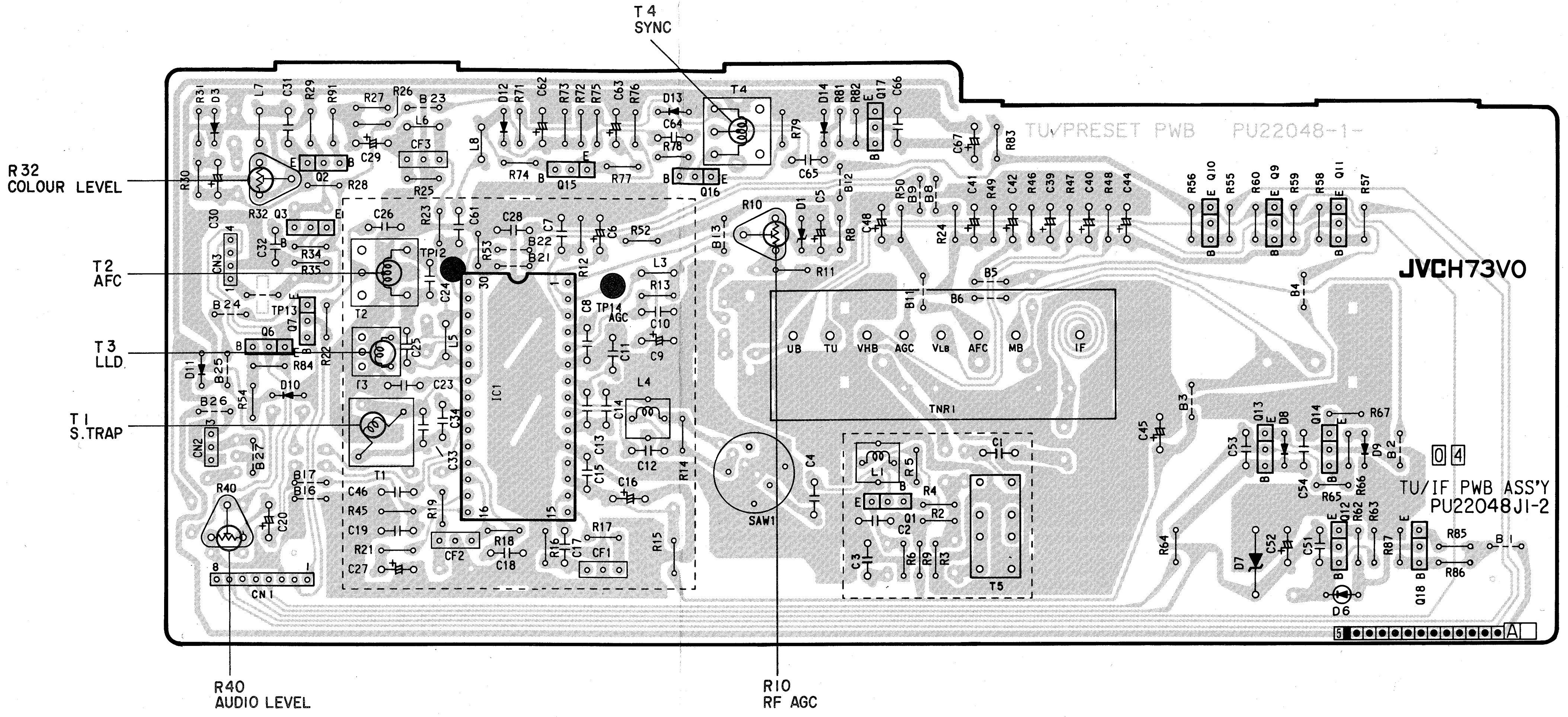
3 3



R202
TRACKING SUB
R204
SHAPNESS
R203
TRACKING
PU11239-1-1
OPE PWB
STOP S211
START S210
TU ↔ AUX
INPUT SELECT
S203
M+ S208
D208
M- S209
H S207
DAY S206
CLK.ADJ S214
TIMER S201
R204
R203
R205
B109
B108
B107
B106
B105
B104
B103
B102
B101
C101
C102
CF101
3 3 OPERATION PWB ASSEMBLY
PU11239A2-1
JVC S75VO
R202
IC101
Q101
DISP.MODE S212
S213 RESET
FF S103
PLAY S106
REW S104
R201
S215 OTR
S202 MEMORY
J2
R102
R103
S102 REC
S101 STOP
S105 PAUSE
J1

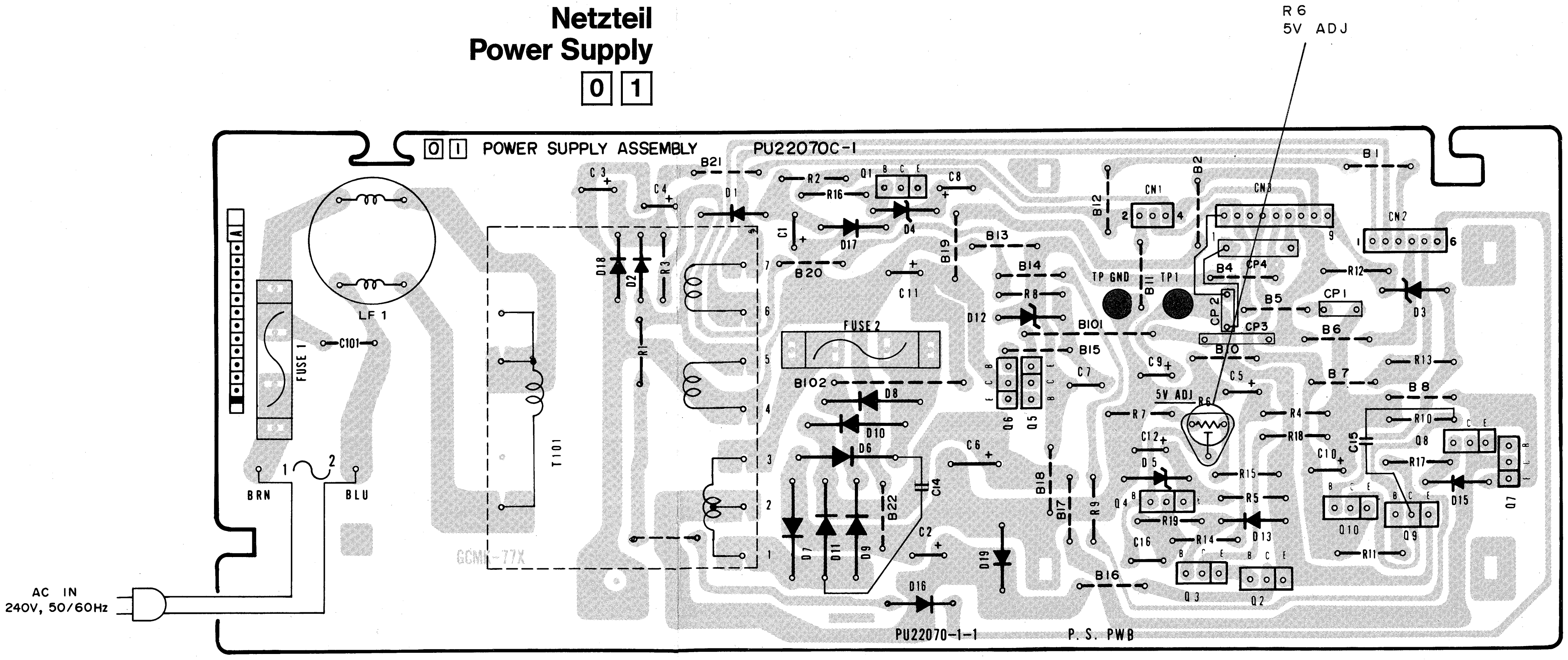
Tuner/ZF-Platte
Tuner/IF Circuit Board

0 4

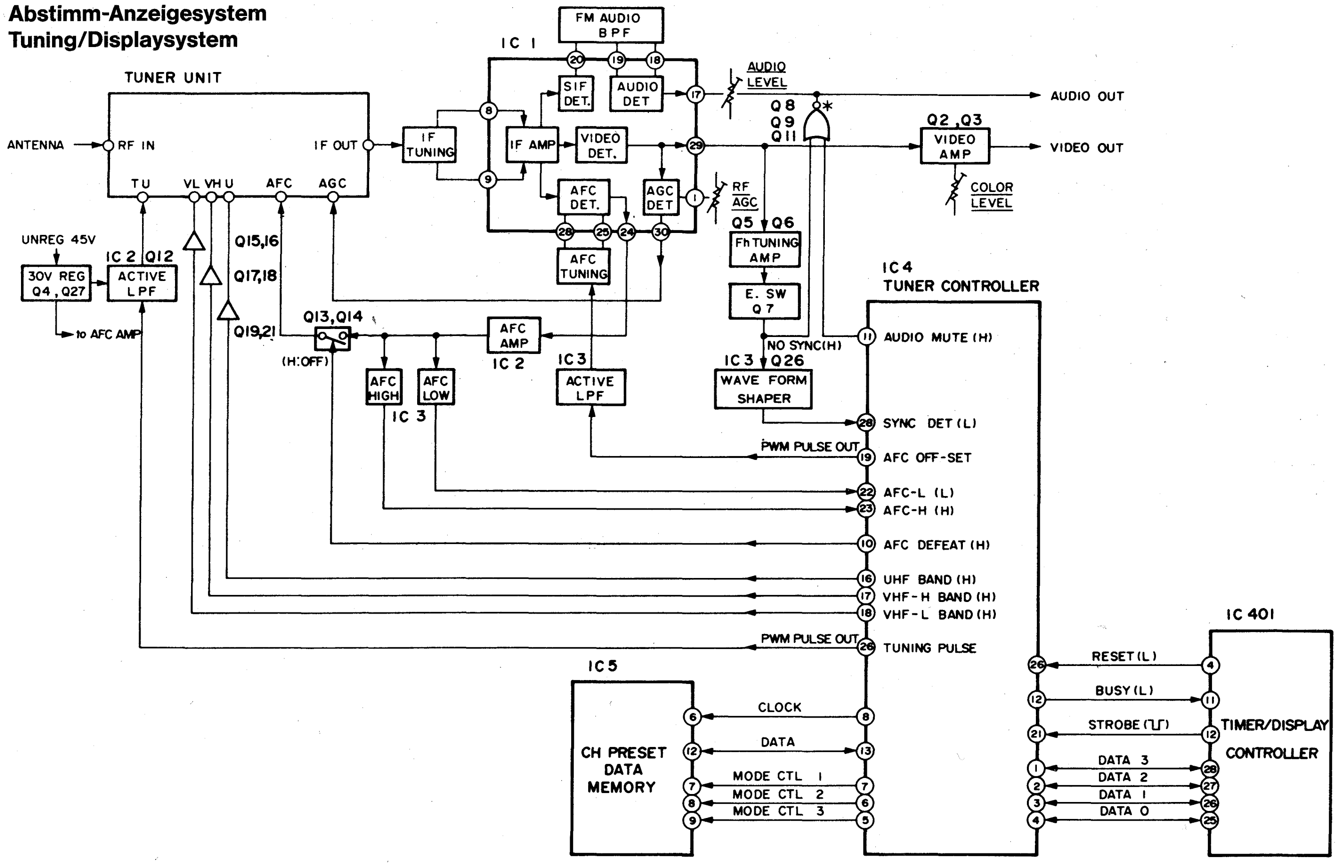

T 4
SYNC
R 32
COLOUR LEVEL
T 2
AFC
T 3
LLD
T I
S.TRAP
R40
AUDIO LEVEL
R10
RF AGC
TU/PRESET PWB PU22048-1-
JVC H73V0
UB
TU
VHB
AGC
VLB
AFC
MB
IF
TNR1
SAW1
IC1
TP12
TP13
TP14
AGC
CN1
CN2
CN3
0 4
TU/IF PWB ASS'Y
PU22048JI-2

Netzteil
Power Supply

0 1


R 6
5V ADJ
0 1 POWER SUPPLY ASSEMBLY
PU22070C-1
LF 1
FUSE 1
FUSE 2
C101
T101
BRN
BLU
AC IN
240V, 50/60Hz
TP GND
TP1
5V ADJ
CN1
CN2
CN3
GCM-77X
PU22070-1-1
P. S. PWB

Abstimm-Anzeigesystem
Tuning/Displaysystem


TUNER UNIT
ANTENNA
RF IN
IF OUT
TU
VL VH U
AFC
AGC
UNREG 45V
30V REG
Q4, Q27
IC 2
Q12
ACTIVE LPF
to AFC AMP
Q15,16
Q17,18
Q19,21
Q13,Q14
(H:OFF)
AFC HIGH
AFC LOW
IC 3
AFC AMP
IC 2
IC3
ACTIVE LPF
IF TUNING
IC 1
FM AUDIO BPF
SIF DET.
AUDIO DET
IF AMP
VIDEO DET.
AFC DET.
AGC DET
AFC TUNING
AUDIO LEVEL
RF AGC
Q8
Q9
Q11
Q5 Q6
Fh TUNING AMP
E. SW
Q7
NO SYNC(H)
IC3 Q26
WAVE FORM SHAPER
Q2, Q3
VIDEO AMP
COLOR LEVEL
AUDIO OUT
VIDEO OUT
IC4
TUNER CONTROLLER
AUDIO MUTE (H)
SYNC DET (L)
PWM PULSE OUT
AFC OFF-SET
AFC-L (L)
AFC-H (H)
AFC DEFEAT (H)
UHF BAND (H)
VHF-H BAND (H)
VHF-L BAND (H)
PWM PULSE OUT
TUNING PULSE
IC5
CH PRESET DATA MEMORY
CLOCK
DATA
MODE CTL 1
MODE CTL 2
MODE CTL 3
IC 401
RESET (L)
BUSY (L)
STROBE
DATA 3
DATA 2
DATA 1
DATA 0
TIMER/DISPLAY CONTROLLER

Audio-IC 1

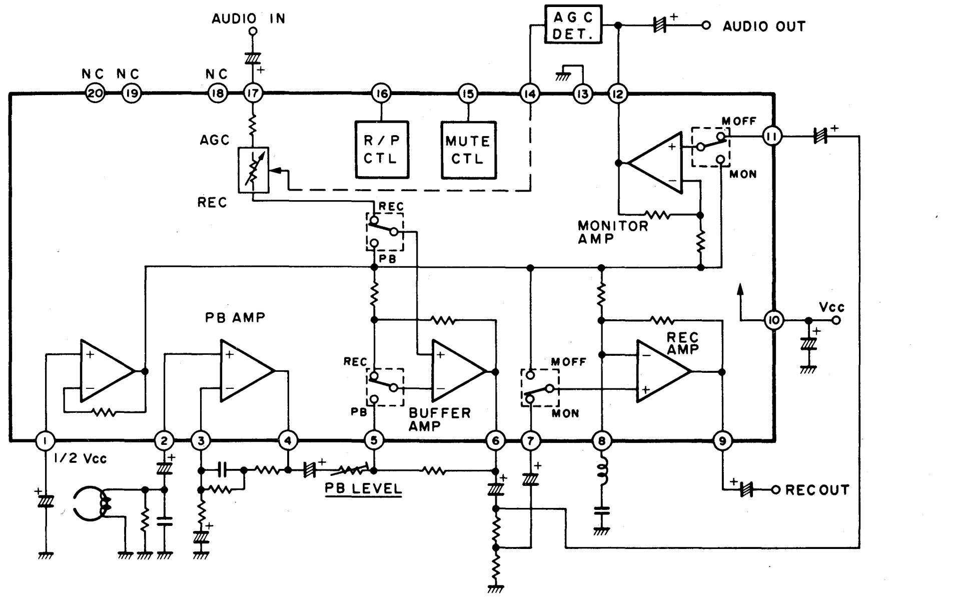

AUDIO IN
AGC DET.
AUDIO OUT
NC NC
NC
AGC
REC
R/P CTL
MUTE CTL
MOFF
MON
MONITOR AMP
REC
PB
PB AMP
REC
PB
BUFFER AMP
MOFF
MON
REC AMP
Vcc
1/2 Vcc
PB LEVEL
REC OUT

Fig. 3-4-1 IC1 block diagram

3.4.2 IC1 pin function

Pin No.	Function
1	Reference voltage
2	PB signal input
3	Feedback
4	PB signal output
5	Buffer amp PB signal input
6	Buffer amp output
7	REC amp output
8	REC peaking adjustment
9	REC amp output
10	Vcc supply
11	Motor amp input
12	Motor amp output
13	GND
14	AGC
15	Muting control
16	REC/PB selector control
17	LINE IN
18	Not used
19	Not used
20	Not used

3.4.3 PB/E-E/REC control

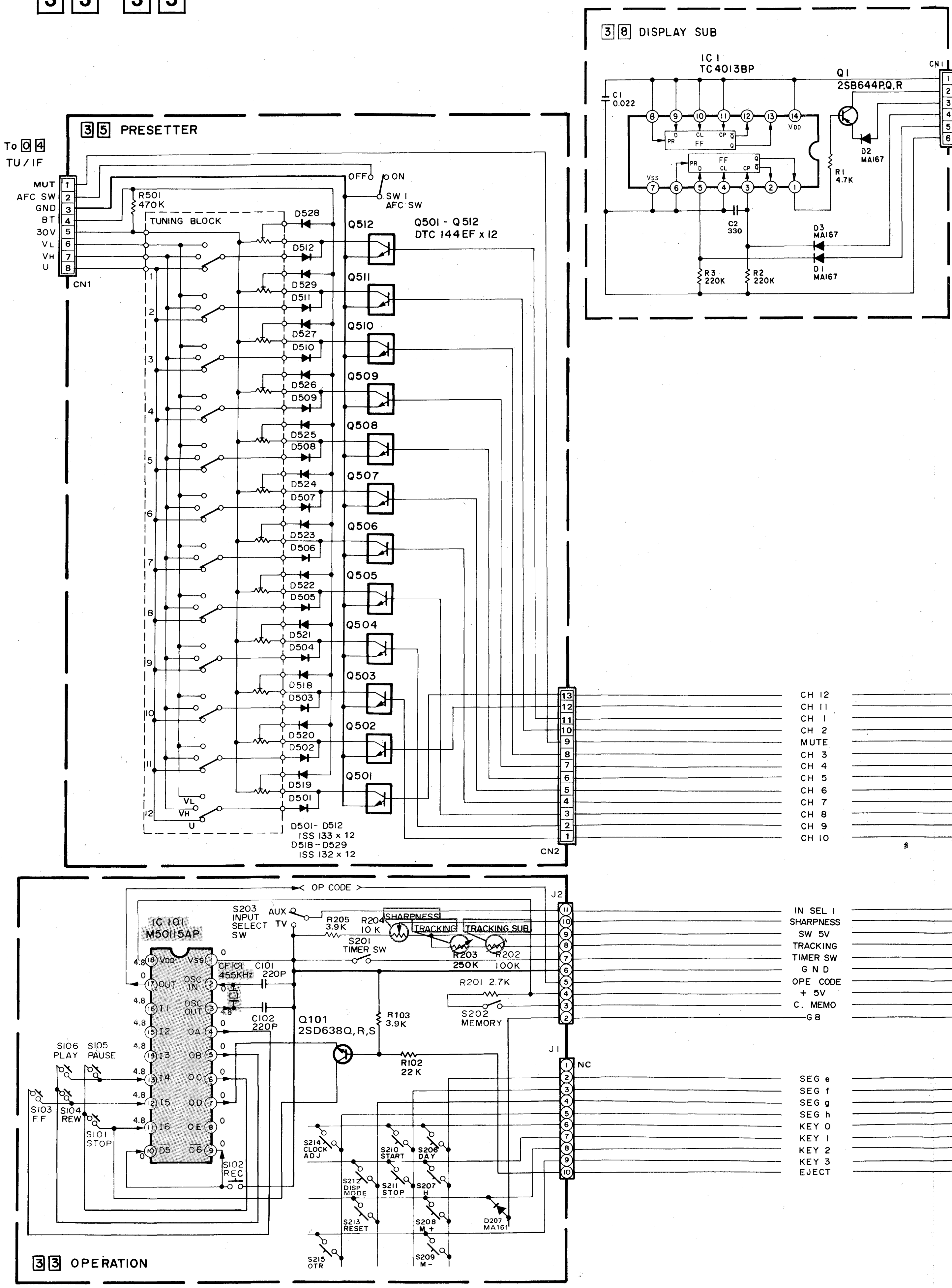
The inside mode of the IC1 is shifted according to the potential of pin 16 of IC1. Refer to Table 3-4-2.

Pin 16	MODE	E. SW	REC AMP
Over 7.5 V	REC	REC	OPERATING
3.3 – 5.6 V	E-E	REC	MUTING
Under 1.6 V	PB	PB	MUTING

Table 3-4-2 IC1 modes

Bedienteil,-Abstimmschaltung
Operation/Presetter Schematic Diagram

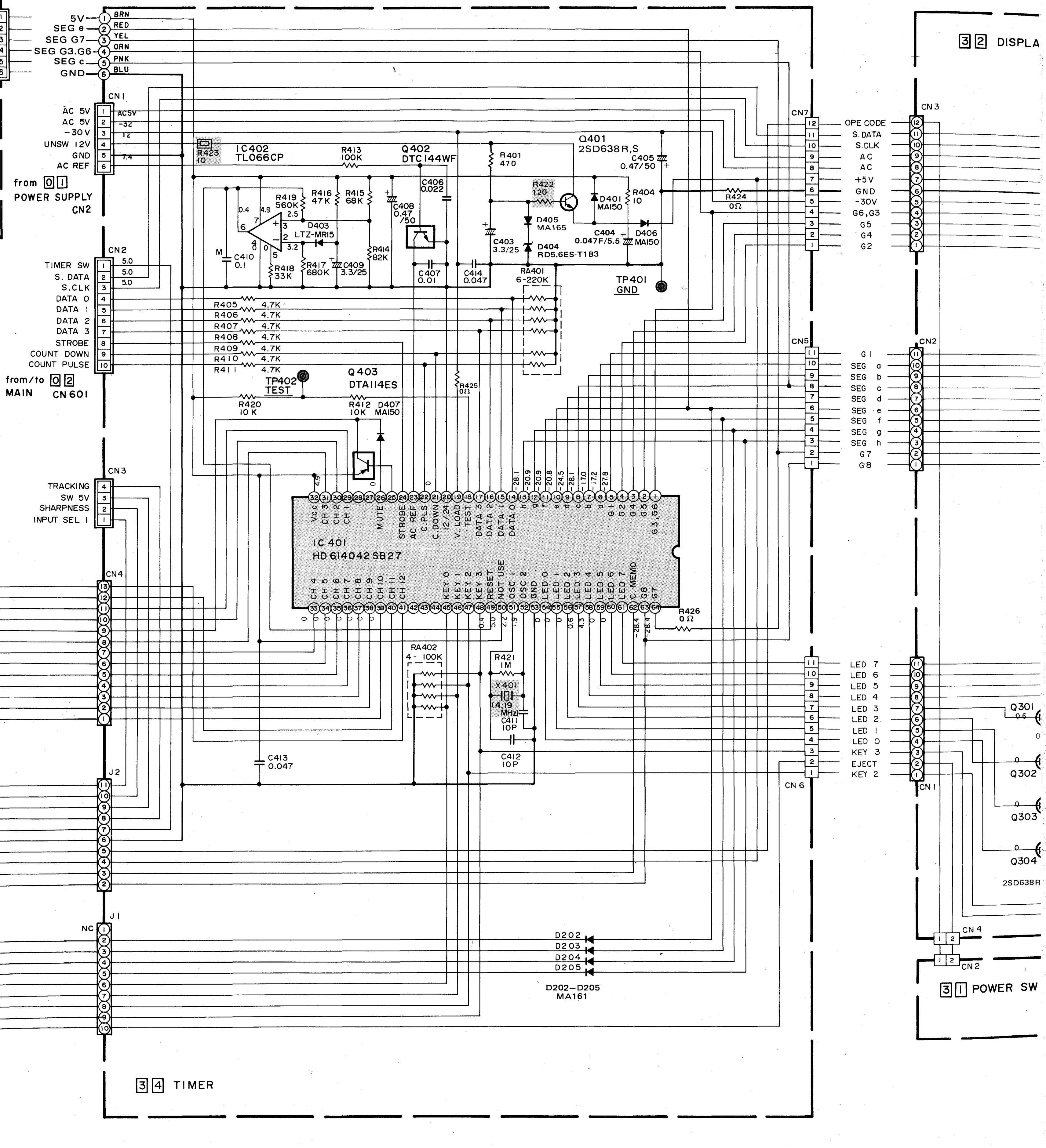
33 35



38 DISPLAY SUB
IC1 TC4013BP
Q1 2SB644P,Q,R
C1 0.022
C2 330
R1 4.7K
R2 220K
R3 220K
D1 MA167
D2 MA167
D3 MA167
CN1
35 PRESETTER
To 04 TU/IF
MUT
AFC SW
GND
BT
30V
VL
VH
U
R501 470K
TUNING BLOCK
OFF
ON
SW1 AFC SW
Q501 - Q512 DTC 144EF x 12
Q512
Q511
Q510
Q509
Q508
Q507
Q506
Q505
Q504
Q503
Q502
Q501
D528
D512
D529
D511
D527
D510
D526
D509
D525
D508
D524
D507
D523
D506
D522
D505
D521
D504
D518
D503
D520
D502
D519
D501
D501 - D512 ISS 133 x 12
D518 - D529 ISS 132 x 12
CN2
CH 12
CH 11
CH 1
CH 2
MUTE
CH 3
CH 4
CH 5
CH 6
CH 7
CH 8
CH 9
CH 10
OP CODE
J2
IC 101 M50115AP
S203 INPUT SELECT SW
AUX
TV
R205 3.9K
R204 10K
SHARPNESS
TRACKING
TRACKING SUB
R203 250K
R202 100K
S201 TIMER SW
CF101 455KHz
C101 220P
C102 220P
R201 2.7K
S202 MEMORY
R103 3.9K
Q101 2SD638Q,R,S
R102 22K
IN SEL 1
SHARPNESS
SW 5V
TRACKING
TIMER SW
GND
OPE CODE
+5V
C. MEMO
G8
J1
NC
SEG e
SEG f
SEG g
SEG h
KEY 0
KEY 1
KEY 2
KEY 3
EJECT
S106 PLAY
S105 PAUSE
S103 FF
S104 REW
S101 STOP
S102 REC
S214 CLOCK ADJ
S210 START
S206 DAY
S212 DISP MODE
S211 STOP
S207 H
S213 RESET
S208 M+
S215 OTR
S209 M-
D207 MA161
33 OPERATION

Timer-Schaltung
Timer Schematic Diagram

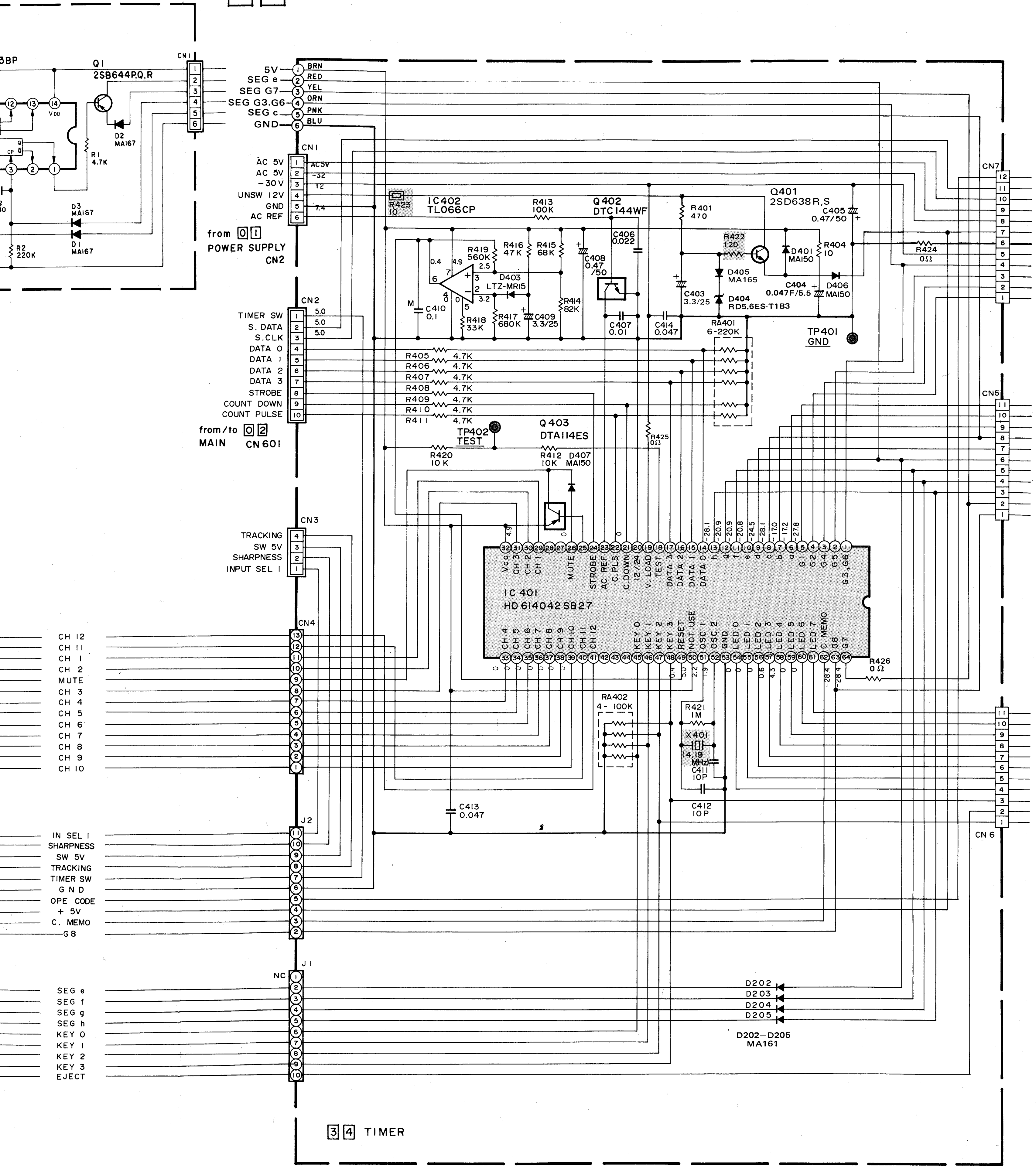
34



5V
SEG e
SEG G7
SEG G3.G6
SEG c
GND
BRN
RED
YEL
ORN
PNK
BLU
CN1
AC 5V
AC 5V
-30V
UNSW 12V
GND
AC REF
from 01 POWER SUPPLY CN2
IC402 TL066CP
R423 10
R413 100K
Q402 DTC144WF
R401 470
Q401 2SD638R,S
C405 0.47/50
R419 560K
R416 47K
R415 68K
C406 0.022
R422 120
D401 MA150
R404 10
R424 0Ω
D403 LTZ-MRI5
C408 0.47/50
D405 MA165
C404 0.047F/5.5
D406 MA150
C410 0.1
R418 33K
R417 680K
C409 3.3/25
R414 82K
C403 3.3/25
D404 RD5.6ES-T1B3
C407 0.01
C414 0.047
RA401 6-220K
TP401 GND
CN2
TIMER SW
S. DATA
S.CLK
DATA 0
DATA 1
DATA 2
DATA 3
STROBE
COUNT DOWN
COUNT PULSE
R405 4.7K
R406 4.7K
R407 4.7K
R408 4.7K
R409 4.7K
R410 4.7K
R411 4.7K
from/to 02 MAIN CN601
TP402 TEST
Q403 DTA114ES
R420 10K
R412 10K
D407 MA150
R425 0Ω
CN3
TRACKING
SW 5V
SHARPNESS
INPUT SEL 1
IC401 HD614042SB27
CN4
RA402 4-100K
R421 1M
X401 (4.19 MHz)
C411 10P
C412 10P
C413 0.047
R426 0Ω
J2
J1
NC
D202
D203
D204
D205
D202-D205 MA161
34 TIMER
CN7
OPE CODE
S. DATA
S.CLK
AC
AC
+5V
GND
-30V
G6,G3
G5
G4
G2
CN5
G1
SEG a
SEG b
SEG c
SEG d
SEG e
SEG f
SEG g
SEG h
G7
G8
CN6
LED 7
LED 6
LED 5
LED 4
LED 3
LED 2
LED 1
LED 0
KEY 3
EJECT
KEY 2
32 DISPLA
CN3
CN2
CN1
Q301
Q302
Q303
Q304
2SD638R
CN4
CN2
31 POWER SW

Timer-Schaltung
Timer Schematic Diagram

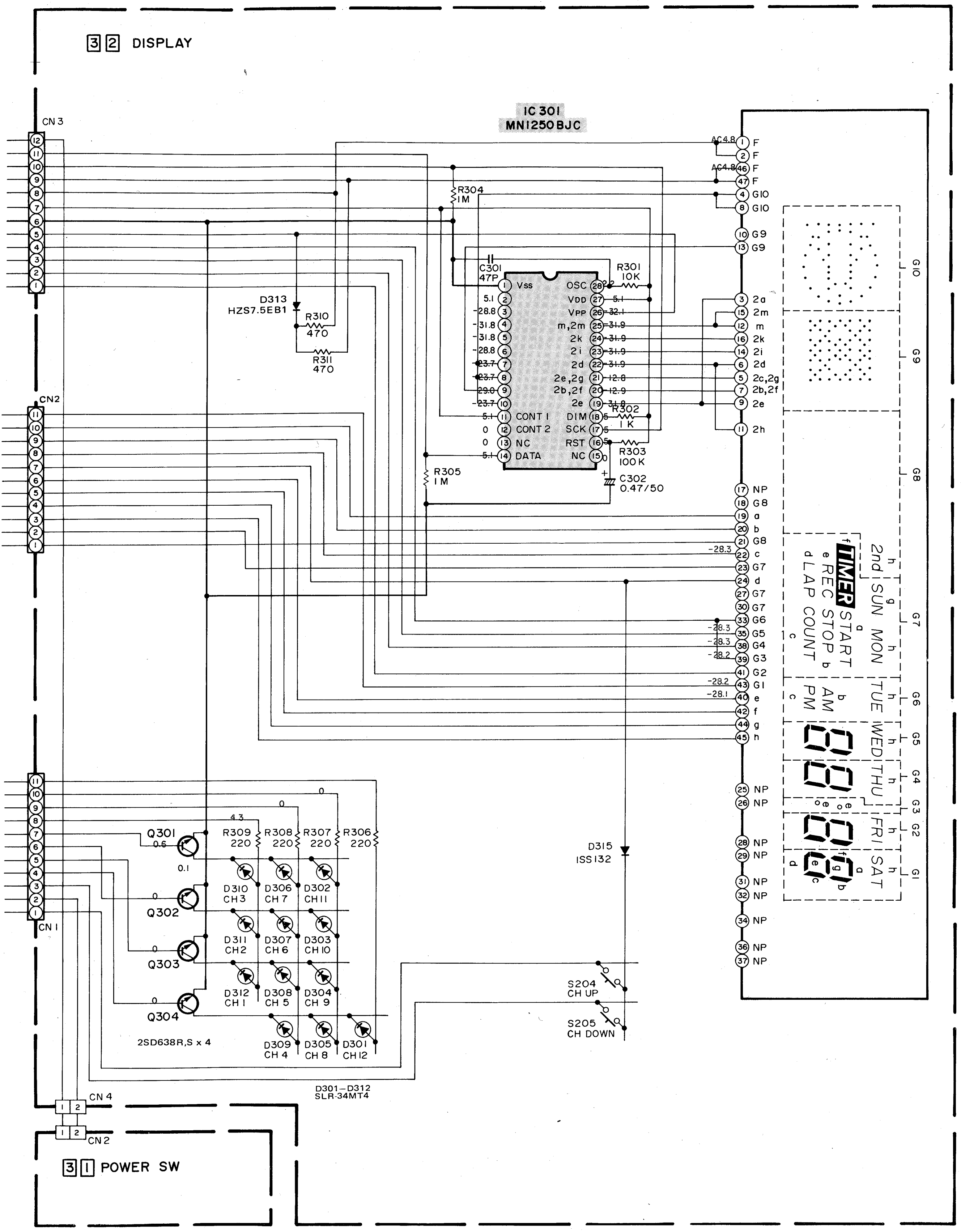
3 4



Q1 2SB644P,Q,R
CN1
5V
SEG e
SEG G7
SEG G3,G6
SEG c
GND
BRN
RED
YEL
ORN
PNK
BLU
D2 MA167
R1 4.7K
D3 MA167
D1 MA167
R2 220K
AC 5V
AC 5V
-30V
UNSW 12V
GND
AC REF
from 0 1
POWER SUPPLY
CN2
R423 10
IC402 TL066CP
R413 100K
Q402 DTC144WF
R401 470
Q401 2SD638R,S
C405 0.47/50
R422 120
D401 MA150
R404 10
R424 0Ω
R419 560K
R416 47K
R415 68K
C408 0.47/50
C406 0.022
D405 MA165
C404 0.047F/5.5
D406 MA150
D403 LTZ-MRI5
C403 3.3/25
D404 RD5.6ES-T1B3
C410 0.1
R418 33K
R417 680K
C409 3.3/25
R414 82K
C407 0.01
C414 0.047
RA401 6-220K
TP401 GND
TIMER SW
S. DATA
S.CLK
DATA 0
DATA 1
DATA 2
DATA 3
STROBE
COUNT DOWN
COUNT PULSE
R405 4.7K
R406 4.7K
R407 4.7K
R408 4.7K
R409 4.7K
R410 4.7K
R411 4.7K
from/to 0 2
MAIN CN601
TP402 TEST
Q403 DTA114ES
R420 10K
R412 10K
D407 MA150
R425 0Ω
CN3
TRACKING
SW 5V
SHARPNESS
INPUT SEL 1
IC401 HD614042SB27
CN4
CH 12
CH 11
CH 1
CH 2
MUTE
CH 3
CH 4
CH 5
CH 6
CH 7
CH 8
CH 9
CH 10
R426 0Ω
RA402 4-100K
R421 1M
X401 (4.19 MHz)
C411 10P
C412 10P
C413 0.047
J2
IN SEL 1
SHARPNESS
SW 5V
TRACKING
TIMER SW
GND
OPE CODE
+5V
C. MEMO
G8
J1
NC
SEG e
SEG f
SEG g
SEG h
KEY 0
KEY 1
KEY 2
KEY 3
EJECT
D202
D203
D204
D205
D202—D205 MA161
CN7
OPE CODE
S. DATA
S.CLK
AC
AC
+5V
GND
-30V
G6,G3
G5
G4
G2
CN5
G1
SEG a
SEG b
SEG c
SEG d
SEG e
SEG f
SEG g
SEG h
G7
G8
CN6
LED 7
LED 6
LED 5
LED 4
LED 3
LED 2
LED 1
LED 0
KEY 3
EJECT
KEY 2
3 4 TIMER

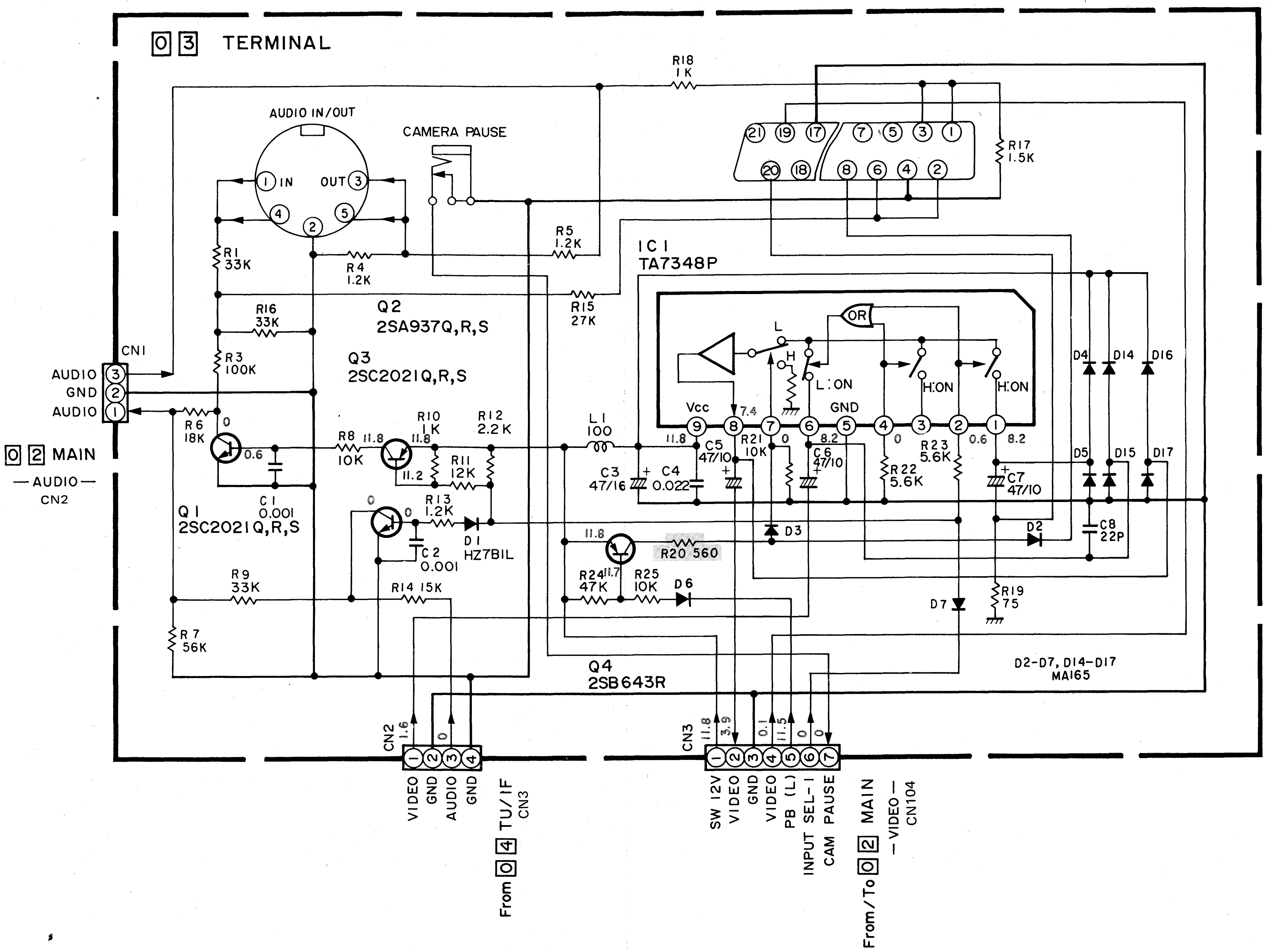
Anzeige-Schaltung
Display Schematic Diagram

3 2

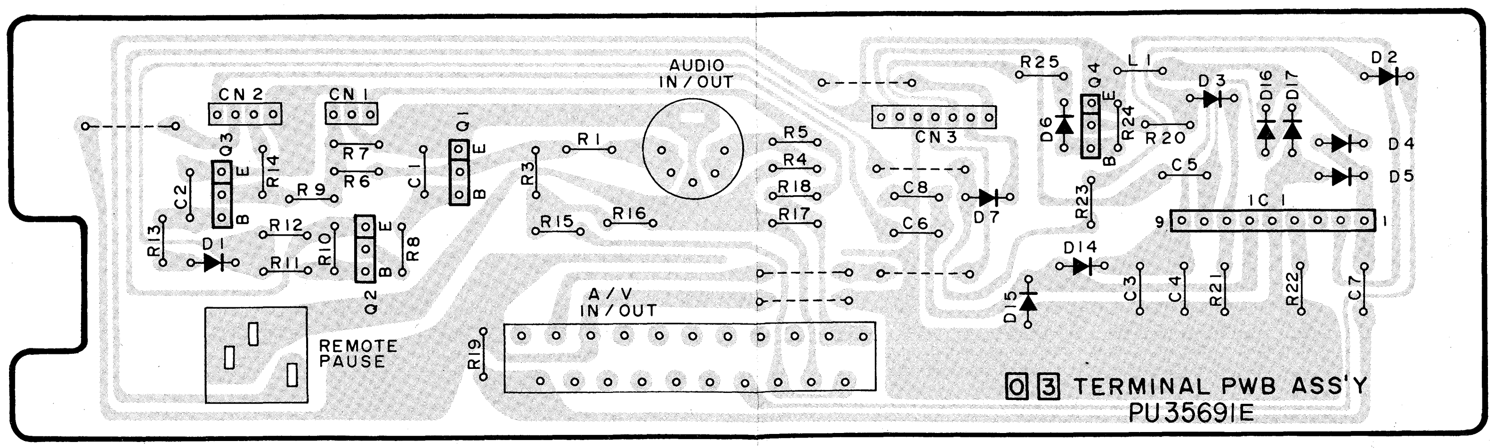


3 2 DISPLAY
CN3
IC301 MN1250BJC
R304 1M
C301 47P
R301 10K
D313 HZS7.5EB1
R310 470
R311 470
R302 1K
R303 100K
C302 0.47/50
R305 1M
Vss
OSC
VDD
VPP
m,2m
2k
2i
2d
2e,2g
2b,2f
2e
CONT 1
CONT 2
NC
DATA
DIM
SCK
RST
NC
CN2
G10
G9
G8
G7
G6
G5
G4
G3
G2
G1
TIMER
2nd
SUN
MON
TUE
WED
THU
FRI
SAT
REC
START
STOP
LAP
COUNT
AM
PM
NP
CN1
Q301
Q302
Q303
Q304
2SD638R,S x 4
R309 220
R308 220
R307 220
R306 220
D310 CH3
D306 CH7
D302 CH11
D311 CH2
D307 CH6
D303 CH10
D312 CH1
D308 CH5
D304 CH9
D309 CH4
D305 CH8
D301 CH12
D301—D312 SLR-34MT4
D315 ISS132
S204 CH UP
S205 CH DOWN
CN4
CN2
3 1 POWER SW

Anschlußbuchsen
Terminal

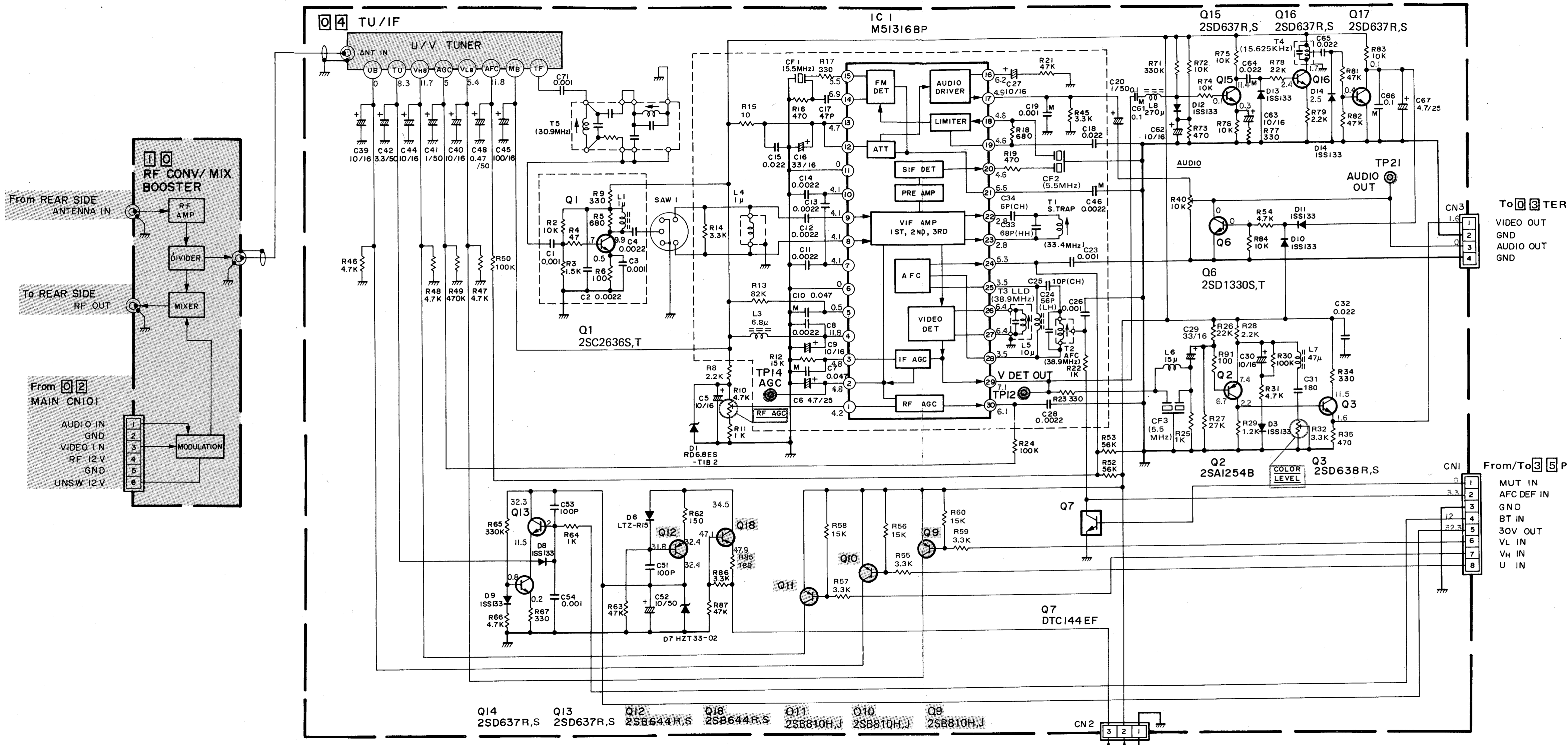


03 TERMINAL
AUDIO IN/OUT
IN
OUT
CAMERA PAUSE
R18 1K
R17 1.5K
R1 33K
R4 1.2K
R5 1.2K
R15 27K
R16 33K
R3 100K
R6 18K
R7 56K
R8 10K
R9 33K
R10 1K
R11 12K
R12 2.2K
R13 1.2K
R14 15K
R19 75
R20 560
R21 10K
R22 5.6K
R23 5.6K
R24 47K
R25 10K
Q1 2SC2021Q,R,S
Q2 2SA937Q,R,S
Q3 2SC2021Q,R,S
Q4 2SB643R
C1 0.001
C2 0.001
C3 47/16
C4 0.022
C5 47/10
C6 47/10
C7 47/10
C8 22P
D1 HZ7BIL
D2 D3 D4 D5 D6 D7 D14 D15 D16 D17
D2-D7, D14-D17 MA165
L1 100
IC1 TA7348P
OR
L H
L:ON
H:ON
Vcc
GND
CN1
AUDIO
GND
AUDIO
02 MAIN
—AUDIO—
CN2
CN2
VIDEO
GND
AUDIO
GND
From 04 TU/IF CN3
CN3
SW 12V
VIDEO
GND
VIDEO
PB (L)
INPUT SEL-1
CAM PAUSE
From/To 02 MAIN —VIDEO— CN104
1.6 0 11.8 3.9 0.1 11.5 0 0
11.8 0.6 11.2 7.4 8.2 0.6 8.2 11.7

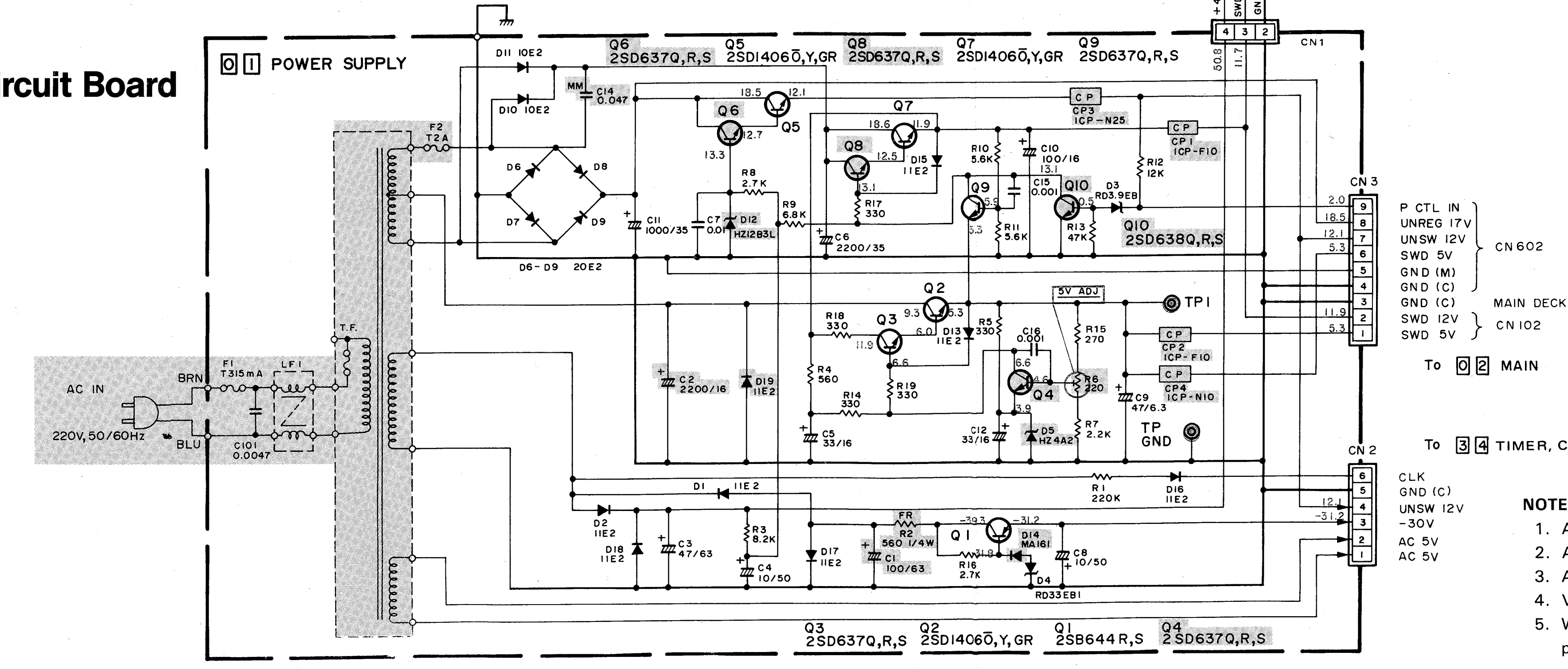


CN2
CN1
Q1 Q2 Q3 Q4
R1 R3 R5 R4 R6 R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17 R18 R19 R20 R21 R22 R23 R24 R25
C1 C2 C3 C4 C5 C6 C7 C8
D1 D2 D3 D4 D5 D6 D7 D14 D15 D16 D17
L1
E B
AUDIO IN/OUT
CN3
IC1
9 1
A/V IN/OUT
REMOTE PAUSE
03 TERMINAL PWB ASS'Y
PU35691E

Tuner/ZF-Schaltung
Tuner/IF Schematic Diagram
0 4


04 TU/IF
U/V TUNER
ANT IN
IC 1 M51316BP
FM DET
AUDIO DRIVER
LIMITER
ATT
SIF DET
PRE AMP
VIF AMP 1ST, 2ND, 3RD
AFC
VIDEO DET
IF AGC
RF AGC
SAW 1
TP14 AGC
TP12
V DET OUT
TP21 AUDIO OUT
Q1 2SC2636S,T
Q2 2SA1254B
Q3 2SD638R,S
Q6 2SD1330S,T
Q7 DTC144EF
Q15 2SD637R,S
Q16 2SD637R,S
Q17 2SD637R,S
COLOR LEVEL
10 RF CONV/MIX BOOSTER
RF AMP
DIVIDER
MIXER
MODULATION
From REAR SIDE ANTENNA IN
To REAR SIDE RF OUT
From 02 MAIN CN101
AUDIO IN
GND
VIDEO IN
RF 12V
GND
UNSW 12V
To 03 TERMINAL, CN2
VIDEO OUT
GND
AUDIO OUT
GND
From/To 35 PRESETTER, CN1
MUT IN
AFC DEF IN
GND
BT IN
30V OUT
VL IN
VH IN
U IN
Q14 2SD637R,S
Q13 2SD637R,S
Q12 2SB644R,S
Q18 2SB644R,S
Q11 2SB810H,J
Q10 2SB810H,J
Q9 2SB810H,J
CN2

Netzteil-Platte
Power Supply Circuit Board
0 1


01 POWER SUPPLY
Q6 2SD637Q,R,S
Q5 2SD1406O,Y,GR
Q8 2SD637Q,R,S
Q7 2SD1406O,Y,GR
Q9 2SD637Q,R,S
Q10 2SD638Q,R,S
AC IN
220V, 50/60Hz
BRN
BLU
F1 T315mA
F2 T2A
LF1
T.F.
C101 0.0047
D6-D9 20E2
5V ADJ
TP1
TP GND
CN1
CN2
CN3
+45V
SWD12V
GND(C)
P CTL IN
UNREG 17V
UNSW 12V
SWD 5V
GND (M)
GND (C)
GND (C)
SWD 12V
SWD 5V
CN602
MAIN DECK
CN102
To 02 MAIN
To 34 TIMER, CN1
CLK
GND (C)
UNSW 12V
-30V
AC 5V
AC 5V
Q3 2SD637Q,R,S
Q2 2SD1406O,Y,GR
Q1 2SB644R,S
Q4 2SD637Q,R,S

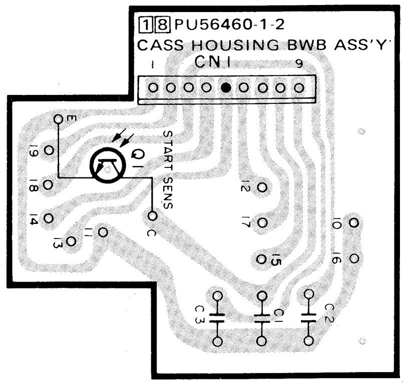
Die Gleichspannungen sind im Aufnahmebetrieb mit einem Digitalvoltmeter gemessen.
Die Spannungen für Wiedergabe stehen in Klammern.
▨ Grau unterlegte Bauteile sind Sicherheitsbauteile und dürfen nur gegen die Original-Ersatzteile ausgewechselt werden.

NOTE: Unless otherwise specified.

1. All resistance values are in ohms. (1/6 W)
2. All inductance values are in μH.
3. All capacitance values are in μF.
4. Voltages are DC-measured with a digital voltmeter during recording mode.
5. Where voltage differs between recording and playback, the voltage during playback is shown in parentheses.

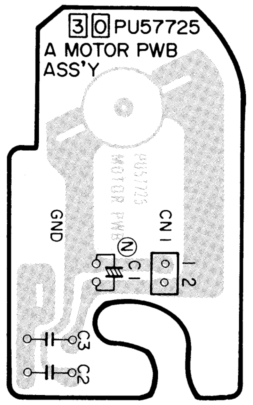
Sensor- und Anschlußbuchsenplatten
Sensor and Terminal Board Assy.

— CASSETTE HOUSING — 1 8



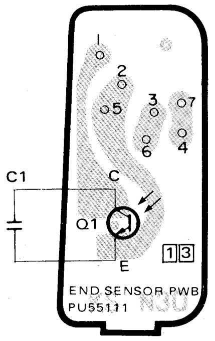
1 8 PU56460-1-2
CASS HOUSING BWB ASS'Y
CN1
1
9
START SENS
Q1
C3
C2

— MODE CTL MOTOR — 3 0



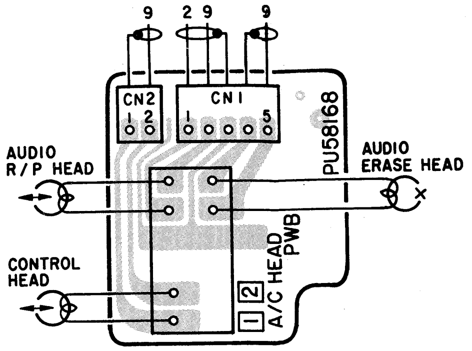
3 0 PU57725
A MOTOR PWB
ASS'Y
GND
CN1
C3
C2

— END SENSOR — 1 3



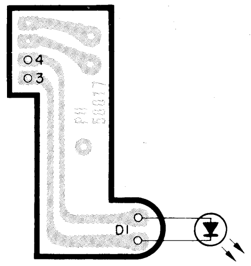
C1
C
Q1
E
1 3
END SENSOR PWB
PU55111

— A/C HEAD — 1 2



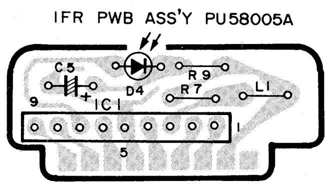
9
2 9
9
CN2
CN1
AUDIO R/P HEAD
AUDIO ERASE HEAD
CONTROL HEAD
PU58168
1 2 A/C HEAD PWB

— CASSETTE LED — 1 5



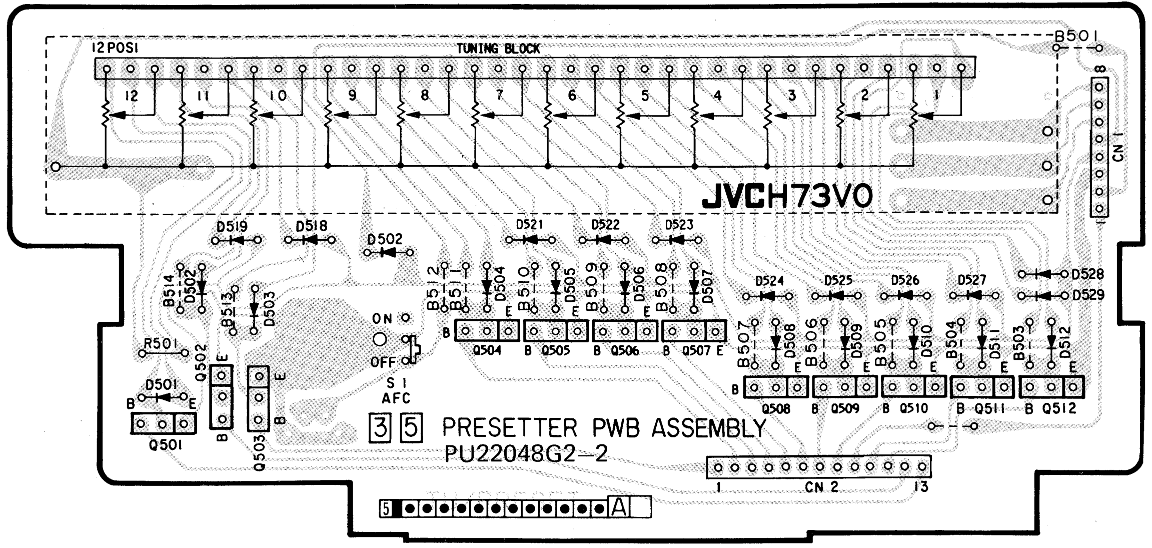
— IFR — 1 6

(VR 3916 OSCAR)
(TR 4916 OSCAR)



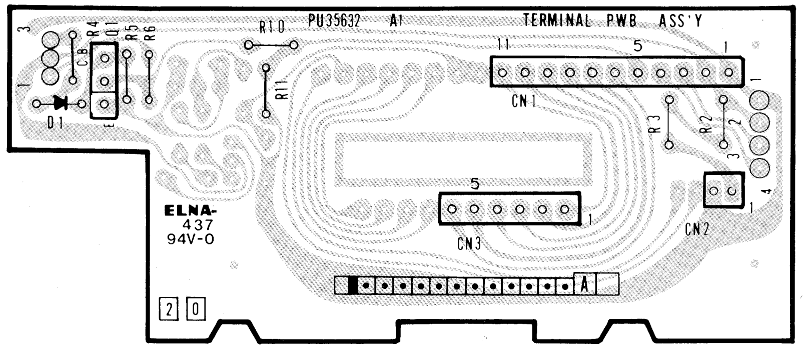
IFR PWB ASS'Y PU58005A
C5
D4
R9
R7
L1
IC1
9
1
5

— PRE SETTER — 3 5



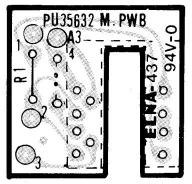
12POSI
TUNING BLOCK
B501
JVC H73V0
CN1
ON
OFF
S1
AFC
Q501
3 5 PRESETTER PWB ASSEMBLY
PU22048G2-2
CN2
1
13

— DECK TERMINAL — 2 0



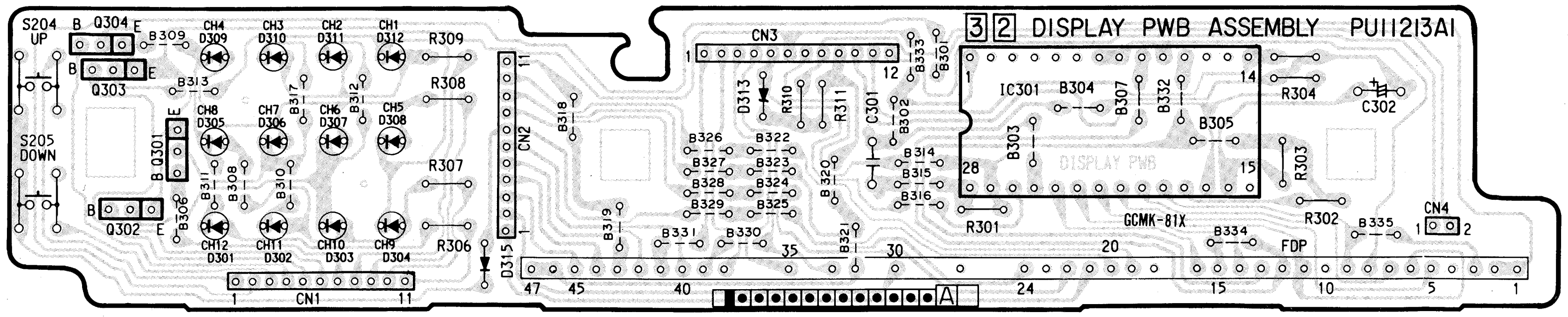
PU35632 A1
TERMINAL PWB ASS'Y
CN1
CN3
CN2
ELNA-437 94V-0
D1
2 0

— MODE (LOADING) SENSOR — 1 4



PU35632 M.PWB
ELNA-437 94V-0
R1

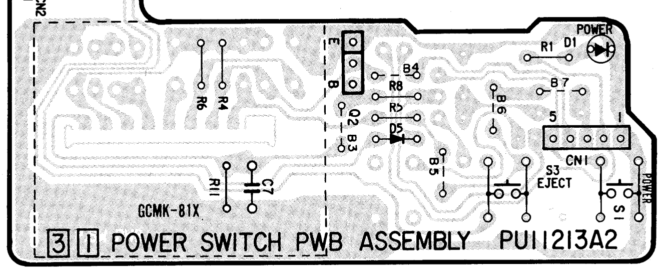
— DISPLAY — 3 2



3 2 DISPLAY PWB ASSEMBLY PU11213A1
S204 UP
S205 DOWN
CN3
CN2
CN1
CN4
IC301
GCMK-81X
FDP
R301
R302
R303
R304
R306
R307
R308
R309
C302

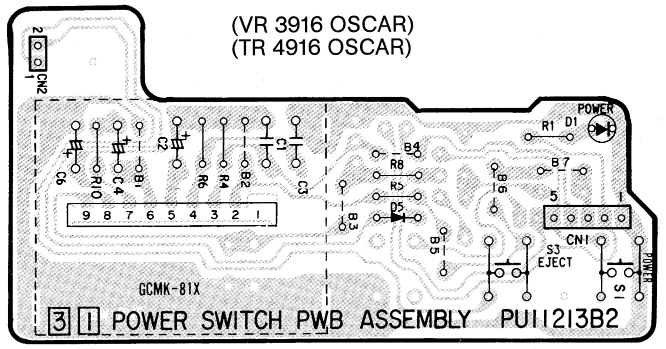
— POWER SW — 3 1

(VR 3906 OSCAR)
(TR 4906 OSCAR)



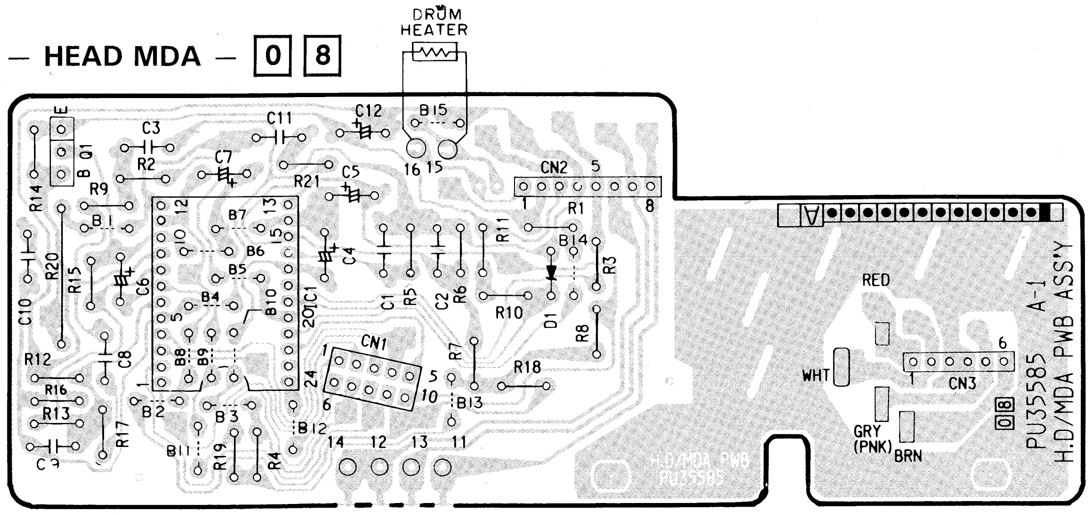
POWER
D1
CN1
S3 EJECT
S1
GCMK-81X
3 1 POWER SWITCH PWB ASSEMBLY PU11213A2

(VR 3916 OSCAR)
(TR 4916 OSCAR)



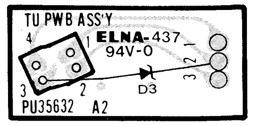
POWER
D1
CN1
S3 EJECT
S1
GCMK-81X
3 1 POWER SWITCH PWB ASSEMBLY PU11213B2

— HEAD MDA — 0 8



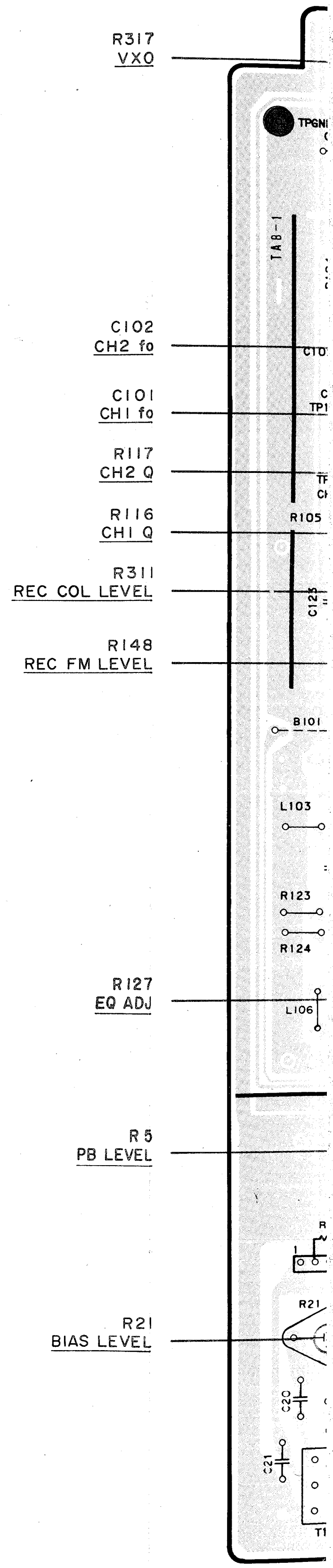
DRUM HEATER
IC1
CN1
CN2
CN3
RED
WHT
GRY (PNK)
BRN
0 8 PU35585 A-1 H.D/MDA PWB ASS'Y
H.D/MDA PWB PU35585

— TAKE UP REEL SENSOR — 2 2



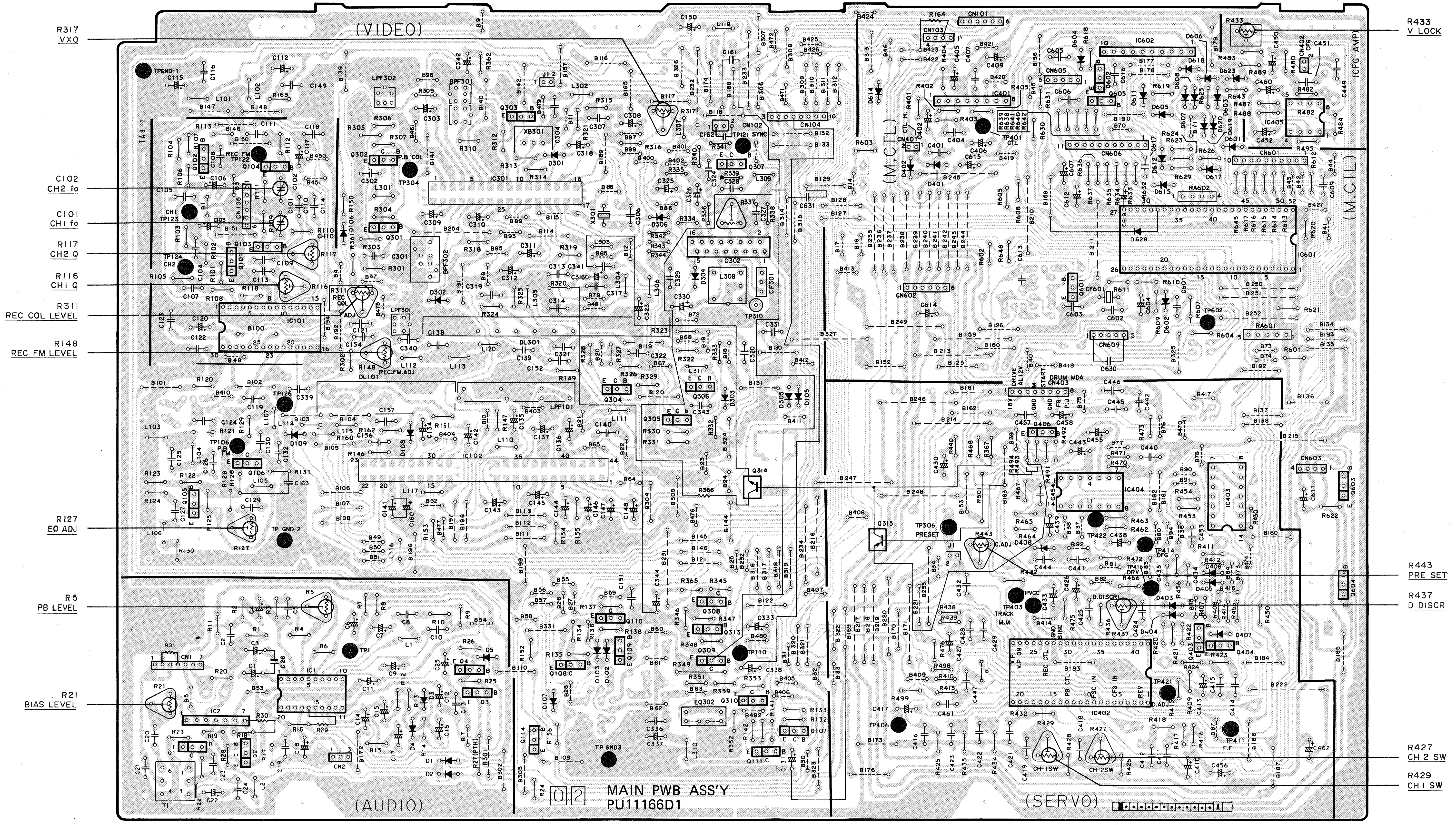
TU PWB ASS'Y
ELNA-437 94V-0
D3
PU35632 A2

Main
Main
0 2



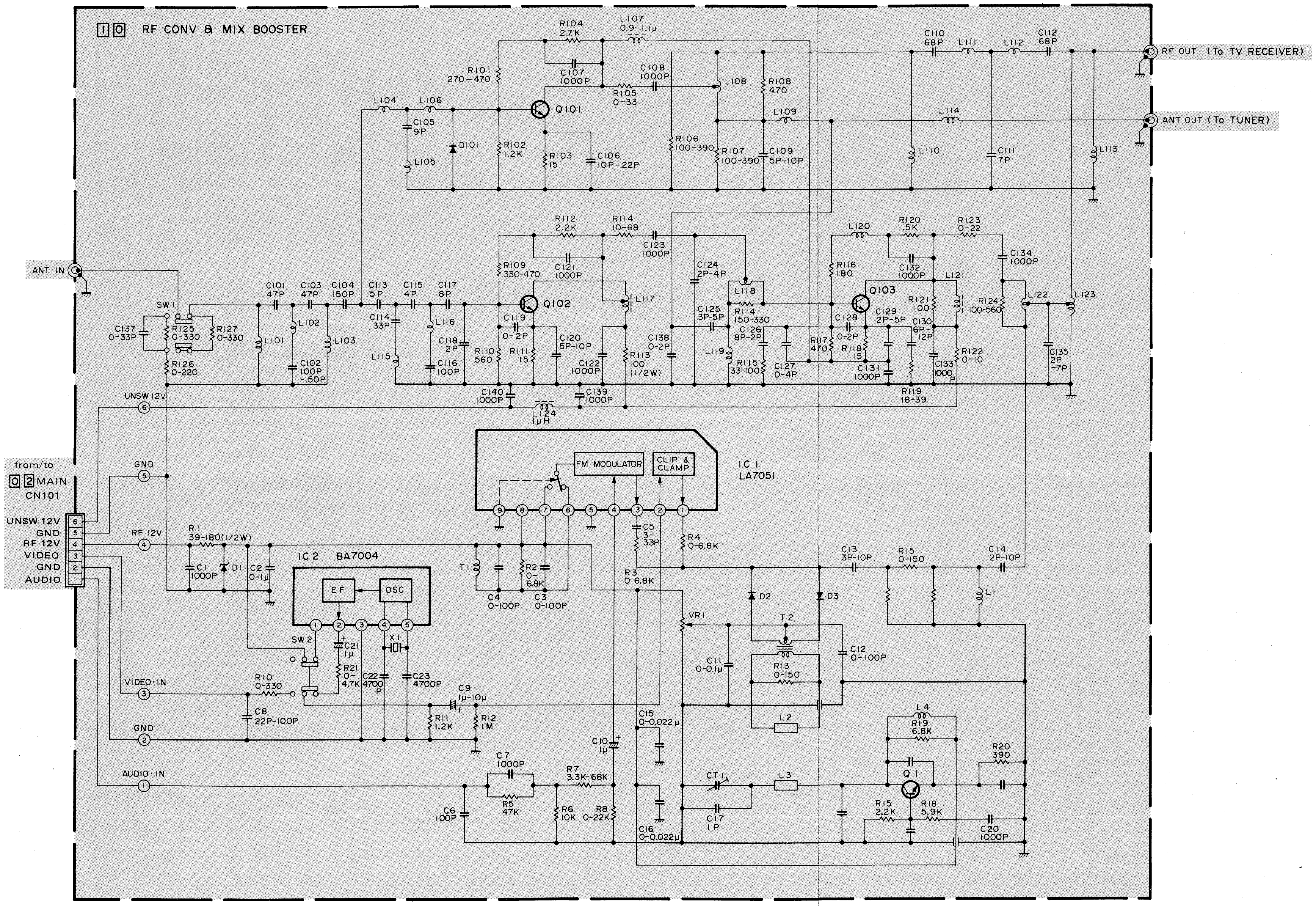
R317 VXO
TPGND
TAB-1
C102 CH2 fo
C101 CH1 fo
R117 CH2 Q
R116 CH1 Q
R311 REC COL LEVEL
R148 REC FM LEVEL
B101
L103
R123
R124
R127 EQ ADJ
L106
R5 PB LEVEL
R21 BIAS LEVEL
C20
C21

Main Platte
Main Circuit Board
0 2


R317
VXO
C102
CH2 fo
C101
CH1 fo
R117
CH2 Q
R116
CH1 Q
R311
REC COL LEVEL
R148
REC FM LEVEL
R127
EQ ADJ
R5
PB LEVEL
R21
BIAS LEVEL
R433
V LOCK
R443
PRE SET
R437
D DISCR
R427
CH 2 SW
R429
CH 1 SW
(VIDEO)
(M.CTL)
(CFG AMP)
(AUDIO)
(SERVO)
0 2
MAIN PWB ASS'Y
PU11166D1

HF-Modulator/Antennenverstärker
RF Conv/Mix Booster

1 0


1 0 RF CONV & MIX BOOSTER
RF OUT (To TV RECEIVER)
ANT OUT (To TUNER)
ANT IN
from/to
0 2 MAIN
CN101
UNSW 12V 6
GND 5
RF 12V 4
VIDEO 3
GND 2
AUDIO 1
UNSW 12V 6
GND 5
RF 12V 4
VIDEO·IN 3
GND 2
AUDIO·IN 1
R104 2.7K
L107 0.9-1.1μ
R101 270-470
C107 1000P
C108 1000P
R105 0-33
L108
R108 470
L109
C110 68P
L111
L112
C112 68P
L114
L110
C111 7P
L113
L104
L106
C105 9P
L105
D101
R102 1.2K
Q101
R103 15
C106 10P-22P
R106 100-390
R107 100-390
C109 5P-10P
R112 2.2K
R114 10-68
C123 1000P
R109 330-470
C121 1000P
Q102
L117
C124 2P-4P
L118
C125 3P-5P
R114 150-330
C126 8P-2P
L119
R115 33-100
C127 0-4P
C138 0-2P
R113 100 (1/2W)
C122 1000P
C139 1000P
C140 1000P
L124 1μH
C119 0-2P
C120 5P-10P
R110 560
R111 15
C118 2P
C116 100P
L116
C114 33P
L115
C113 5P
C115 4P
C117 8P
C101 47P
C103 47P
C104 150P
L102
L101
L103
C102 100P -150P
SW1
C137 0-33P
R125 0-330
R127 0-330
R126 0-220
L120
R120 1.5K
R123 0-22
C134 1000P
R116 180
C132 1000P
Q103
L121
R121 100
R124 100-560
L122
L123
C128 0-2P
C129 2P-5P
C130 6P-12P
R117 470
R118 15
C131 1000P
C133 1000P
R122 0-10
C135 2P-7P
R119 18-39
FM MODULATOR
CLIP & CLAMP
IC1 LA7051
9 8 7 6 5 4 3 2 1
C5 3-33P
R4 0-6.8K
R3 0 6.8K
R1 39-180(1/2W)
C1 1000P
D1
C2 0-1μ
IC2 BA7004
EF
OSC
1 2 3 4 5
T1
R2 0-6.8K
C4 0-100P
C3 0-100P
SW2
C21 1μ
R21 0-4.7K
C22 4700P
X1
C23 4700P
C9 1μ-10μ
R10 0-330
C8 22P-100P
R11 1.2K
R12 1M
C13 3P-10P
R15 0-150
C14 2P-10P
D2
D3
L1
VR1
T2
C11 0-0.1μ
R13 0-150
C12 0-100P
L2
C15 0-0.022μ
C10 1μ
C7 1000P
R5 47K
R7 3.3K-68K
C6 100P
R6 10K
R8 0-22K
C16 0-0.022μ
CT1
C17 1P
L3
L4
R19 6.8K
Q1
R20 390
R15 2.2K
R18 5.9K
C20 1000P

KUNDENDIENST

ITT Graetz

S E R V I C E

MANUAL

Ersatzteile-Listen
Spare Parts Lists
Explosions-Darstellungen
Exploded-View Diagrams
Teil 3 / Part 3

**VR
119-3**
1985

VIDEORECORDER 3906, 3916
TELERECORDER 4906, 4916

V450

VHS
TELERECORDER 4906
Graetz
88:88

VHS
88:88
VR 3906
ITT

Dieses Manual gilt in Verbindung mit folgenden Manualen:

VR 119-1	Schaltbilder – Lagepläne Bestell-Nr. 6611 8216
VR 119-2	Einstellanweisung der Mechanik und Elektronik Bestell-Nr. 6611 8217
VR 119-3	Ersatzteile-Listen Bestell-Nr. 6611 8218

This manual is to be used in conjunction with the following Service Manuals:

VR 119-1	Schematic Diagrams – Circuit Boards Part. No. 6611 8216
VR 119-2	Mechanical and Electronic Adjustments Part. No. 6611 8217
VR 119-3	Spare Parts Lists Part. No. 6611 8218

Bei Reparaturen gültige Sicherheitsvorschriften beachten!

Ersatzteil-
Bestellungen
✆ 07231/ 13338
✆ 07231/~~356665~~ 593000
BTX-Ersatzteil-Bestellseite
☎ *4050065#

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Mechanische Ersatzteile
Mechanical Spare Parts

			Abbildungen Figures
M1	Gehäuse Cabinet Assembly	13	15,16
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M3	Chassis kpl. (1) Mechanism Assy. (1)	13	17,18
M4	Cassettenschacht Cassette Housing Assy.	14	20

Allgemeine Bauteile
General Parts

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
	Abstimmeinheit Presetter	3117 90 87
1 0	Antennenverstärker Mix Booster	5826 01 83
P 51, M 3	Audio-Synchronkopf A/CTL Head	4335 92 34
P 109, M 3	Capstan-Motor	4432 92 06
M 4	Cassettenschacht kpl. Cassette Housing Assy. incl.	8318 45 53
P 18, M 4	Cassettenschacht-Motor Cassette Housing Motor	4432 91 70
P 43, M 3	Hauptlöschkopf Full Erase Head	4337 91 58
P 26, M 2	Impulsaufnahmekopf Pick-up Head	4335 92 27
	IR-Sender kpl. Remote Control Unit incl.	5652 21 20
1 0	Modulator RF Converter	5826 01 83
P 21, M 2	Kopftrommeloberteil Upper Drum Assy.	4335 92 26
P 36, M 2	⚠ Netztrafo Power Transformer	4511 35 45
	Tuner	5823 07 27

Lehren und Werkzeuge
Required Jigs and Tools

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
	Abgleichband MH-2 Alignment Tape MH-2	1318 88 33
	Bandzug-Meßkassette Back Tension Cassette	1318 88 58
	Drehmomentmesser Torque Gauge Assy.	1318 88 56
	Abgleichdreher Tapered Nut Driver	1318 88 42

Zubehör
Accessory
Videorecorder 3906

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
	Bedienungsanleitung Instruction Book	6612 39 48
	Aufkleber Kurzbedienungsanleitung für Klappe Brief Instruction Lable for Door	6612 39 46
P 1	Verpackungskarton Packing Case	6162 39 68
P 2	Verpackungspolster Cushion Assy.	6172 07 27
P 11	Antennenkabel Arial Cable	4131 41 20

Zubehör
Accessory
Videorecorder 3916

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
	Bedienungsanleitung Instruction Book	6612 39 45
	Aufkleber Kurzbedienungsanleitung für Klappe Brief Instruction Lable for Door	6612 39 46
P 1	Verpackungskarton Packing Case	6162 39 68
P 2	Verpackungspolster Cushion Assy.	6172 07 27
P 11	Antennenkabel Arial Cable	4131 41 20

Zubehör
Accessory
Telerecorder 4906

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
	Bedienungsanleitung Instruction Book	6612 39 49
P 1	Verpackungskarton Packing Case	6162 39 67
P 2	Verpackungspolster Cushion Assy.	6172 07 28
P 11	Antennenkabel Arial Cable	4131 41 20

Zubehör
Accessory
Telerecorder 4916

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
	Bedienungsanleitung Instruction Book	6612 39 47
P 1	Verpackungskarton Packing Case	6162 39 67
P 2	Verpackungspolster Cushion Assy.	6172 07 28
P 11	Antennenkabel Arial Cable	4131 41 20

0 1 Netzteil-Platte
Power Supply Board

Transistoren/Transistors

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Q 1	2 SB 644 R	3614 36 33
Q 2	2 SD 1406 GR	3614 49 85
Q 3, 4	2 SD 637 R	3614 47 12
Q 5	2 SD 1406 GR	3614 49 85
Q 6	2 SD 637 R	3614 47 12
Q 7	2 SD 1406 GR	3614 49 85

Elektrische Ersatzteile-Liste
Electrical Spare Parts List

Videorecorder 3906, 3916
Telerecorder 4906, 4916

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Q 8, 9	2 SD 637 R	3614 47 12
Q 10	2 SD 638 R	3614 36 56
Dioden/Diodes		
D 1, 2	11 E 2	3656 27 89
D 3	RD 3,9 EB	3653 20 13
D 4	RD 33 EB 1	3656 29 14
D 5	HZ 4 A 2	3656 29 12
D 6-9	20 E 2	3656 28 82
D 10, 11	10 E 2	3656 22 33
D 12	HZ 12 B-3 L	3656 21 83
D 13	11 E 2	3656 27 89
D 14	MA 161 FV	3656 22 43
D 15-19	11 E 2	3656 27 89
Sicherungs-IC/Circuit Protector		
CP 1, 2	⚠ ICP-F 10	3771 43 47
CP 3	⚠ ICP-N 25	3771 47 84
CP 4	⚠ ICP-N 10	3771 43 48
Widerstände/Resistors		
R 2	⚠ 560 Ohm	3151 82 26
Trimmer-Widerstände/Trimmer Resistors		
R 6	220 Ohm	3111 86 46
Elkos/Electrolytic Capacitors		
C 1	100 uF 63 V MIN	3422 87 12
C 2	2200 uF 16 V	3422 87 13
C 3	47 uF 63 V MIN	3422 86 54
C 4	10 uF 63 V	3422 65 32
C 5	33 uF 16 V	3421 09 54
C 6	2200 uf 35 V	3422 87 14
C 8	10 uF 63 V	3422 65 32
C 9	47 uF 10 V MIN	3422 85 31
C 10	100 uF 16 V	3422 27 84
C 11	1000 uF 35 V	3422 87 15
C 12	33 uF 16 V	3421 09 54
Filter/Filters		
LF 1		4552 93 04

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Allgemeine Bauteile/General Parts		
F 1	⚠ Sicherung 0,315 AT Fuse 0,315 AT	4375 10 11
F 2	⚠ Sicherung 2 AT Fuse 2 AT	4375 16 18

0 2 Audio/Video/Servo/Mech.-Ablaufst.-Platte A/S/M/V-Board

Audio-Teil
Audio-Section

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Integrierte Schaltungen/Integrated Circuits		
IC 1	AN 3991 K	3771 47 67
IC 2	TA 7361 AP	3771 47 85
Transistoren/Transistors		
Q 1	2 SD 636 Q	3614 36 78
Q 2	DTC 124 F	3614 48 57
Q 3	2 SB 643 Q	3614 48 12
Q 4	2 SD 636 Q	3614 36 78
Dioden/Diodes		
D 1-5	MA 165	3656 29 95
Trimmer-Widerstände/Trimmer Resistors		
R 5, 21	2,2 kOhm	3111 86 31
Elkos/Electrolytic Capacitors		
C 1	47 uF 10 V	3422 21 83
C 3	1 uF 63 V MIN	3422 85 28
C 6, 7	4,7 uF 25 V	3422 41 05
C 9	1 uf 50 V	3422 08 14
C 11	33 uF 16 V	3421 09 54
C 12	1 uF 50 V	3422 08 14
C 14	22 uF 16 V	3422 30 08
C 15	0,47 uF 50 V	3422 61 52
C 16	10 uF 25 V MIN	3422 86 42
C 17	33 uF 10 V MIN	3422 85 37
C 18	4,7 uF 25 V	3422 41 05
C 22, 25	33 uF 16 V	3421 09 54
Spulen/Coils		
L 1		4543 18 46
L 2		4543 18 47

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Filter/Filters		
T 1		4552 93 05
Allgemeine Bauteile/General Parts		
R 27	PTC/Posistor	3172 91 99

Video-Signalteil
Video Section

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Integrierte Schaltungen/Integrated Circuits		
IC 101	HA 11839 NT	3771 47 82
IC 102	PU 22031 A	3771 47 86
Transistoren/Transistors		
Q 101-105	2 SC 2021 RS	3614 47 18
Q 106	2 SB 641 Q	3614 36 71
Q 107	2 SB 810 H, J	3614 52 01
Q 108	2 SA 564 R	3614 40 33
Q 109	DTC 144 WF	3614 48 71
Q 110	2 SA 564 R	3614 40 33
Q 111	2 SC 2655 Y	3614 36 47
Q 114	DTC 144 F	3614 48 70
Dioden/Diodes		
D 102-109	MA 165	3656 29 25
Trimmer-Widerstände/Trimmer Resistors		
R 116, 117	1 kOhm	3111 86 32
R 127	2,2 kOhm	3111 86 31
R 148	1 kOhm	3111 86 32
Trimmer-Kondensatoren/Trimmer Capacitors		
C 101, 102		3412 90 31
Elkos/Electrolytic Capacitors		
C 102, 103	0, 47 uF 50 V	3422 61 52
C 112	10 uF 16 V MIN	3422 85 30
C 115	47 uF 10 V	3422 21 83
C 117	47 uF 10 V MIN	3422 85 31
C 120	0,1 uF 50 V	3422 09 37
C 131, 134, 135	1 uF 50 V	3422 08 14
C 136	100 uF 10 V MIN	3422 85 38
C 137	2,2 uF 50 V	3422 61 53
C 141	100 uF 6,3 V MIN	3422 85 26
C 142	3,3 uF 25 V MIN	3422 85 41
C 143	1 uF 50 V MIN	3422 86 94
C 144	2,2 uF 50 V MIN	3422 85 09
C 145	3,3 uF 25 V MIN	3422 85 41
C 146	2,2 uF 50 V MIN	3422 85 09
C 147	4,7 uF 25 V MIN	3422 85 32
C 148	3,3 uF 25 V MIN	3422 85 41
C 150	47 uF 16 V MIN	3422 85 42
C 159	47 uF 10 V	3422 86 96
Spulen/Coils		
L 101, 102		4543 93 06
L 103, 104		4543 96 31
L 105		4543 96 30
L 106		4543 99 42
L 107		4543 96 56
L 110		4543 95 43
L 111		4543 95 25
L 112		4543 96 34
L 113		4543 96 33
L 114, 115		4543 95 45
L 116		4543 93 66
L 117		4543 93 10
L 119		4543 93 06
L 120		4543 99 42
Allgemeine Bauteile/General Parts		
DL 101	Verzögerungsleitung 1 H Delay Line	4342 11 64

Farbsignalteil
Colour Section

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Integrierte Schaltungen/Integrated Circuits		
IC 301	PU 22046 A	3771 47 87
IC 302	BA 7007	3771 44 42
Transistoren/Transistors		
Q 301, 302	2 SC 2021 RS	3614 47 18
Q 303	DTC 144 F	3614 48 70
Q 304-308	2 SC 2021 RS	3614 47 18
Q 309, 310, 313	2 SB 641 Q	3614 36 71

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Q 314	DTC 124 N	3614 48 69
Q 315	DTC 144 N	3614 49 27
Dioden/Diodes		
D 301-306	MA 165	3656 29 25
Trimmer-Widerstände/Trimmer Resistors		
R 311	220 Ohm	3111 86 46
R 317	22 kOhm	3111 86 34
R 337	4,7 kOhm	3111 85 97
Elkos/Electrolytic Capacitors		
C 303	10 uF 16 V MIN	3422 85 30
C 308	1 uF 50 V	3422 08 14
C 309	0,47 uF 50 V	3422 61 52
C 310	47 uF 10 V MIN	3422 85 31
C 311	4,7 uF 25 V	3422 41 05
C 312	3,3 uF 25 V MIN	3422 85 41
C 316	10 uF 16 V MIN	3422 85 30
C 318	2,2 uF 50 V	3422 61 53
C 323	47 uF 10 V MIN	3422 85 31
C 325	47 uF 16 V	3422 30 11
C 326	33 uF 10 V MIN	3422 85 37
C 330	10 uF 16 V MIN	3422 85 30
C 333	47 uF 10 V MIN	3422 85 31
C 337	47 uF 16 V MIN	3422 85 42
C 338	470 uF 6,3 V	3422 87 16
C 342	10 uF 16 V MIN	3422 85 30
C 344	47 uF 25 V	3422 37 52
Spulen/Coils		
L 301		4543 99 62
L 302, 303		4543 93 06
L 304		4543 92 63
L 305		4543 96 26
L 306, 307		4543 93 06
L 308		4543 92 64
L 309		4543 94 08
L 310		4543 93 06
L 311		4543 98 55

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Filter/Filters		
CF 301		4552 92 50
LPF 301		4552 92 98
LPF 302		4552 91 90
BPF 301		4552 92 45
BPF 302		4552 92 52
EQ 302		4552 91 68
Allgemeine Bauteile/General Parts		
X 301	Quarz/Crystal Block	4421 24 04
XB 301	Quarz/Crystal Block	4421 24 15
DL 301	Verzögerungsleitung Delay Line	4342 11 62

Servo-Teil
Servo-Section

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Integrierte Schaltungen/Integrated Circuits		
IC 401	BA 6305 LN	3771 45 53
IC 402	HA 11827 NT	3771 47 81
IC 403	BU 4066 B	3771 47 80
IC 404	uPC 324 C	3771 41 51
IC 405	M 5218 P	3771 46 91
Transistoren/Transistors		
Q 403	2 SB 641 R	3614 47 04
Q 404, 406	2 SD 636 R	3614 47 11
Dioden/Diodes		
D 401-407	MA 165	3656 29 25
D 408	RD 5,1 ES-T1B3	3656 29 16
Trimmer-Widerstände/Trimmer Resistors		
R 427, 429	470 kOhm	3111 86 47
R 433	470 kOhm	3111 86 48
R 437	100 kOhm	3111 86 49
R 443	220 kOhm	3111 86 01
Elkos/Electrolytic Capacitors		
C 402	22 uF 16 V	3422 30 08
C 405	47 uF 10 V	3422 21 83
C 406	47 uF 16 V	3422 30 11
C 409, 417	10 uF 16 V MIN	3422 85 30
C 426	1 uF 50 V	3422 08 14
C 430	22 uF 25 V MIN	3422 86 44

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
C 433	10 uF 16 V MIN	3422 85 30
C 443	10 uF 25 V MIN	3422 86 42
C 450	2,2 uF 50 V	3422 61 53
C 452	10 uF 16 V MIN	3422 85 30
C 455	1 uF 50 V	3422 08 14
C 458, 460	10 uF 16 V MIN	3422 85 30

Mechacon-Teil
Mechacon Section

Mechacon Section

Integrierte Schaltungen/Integrated Circuits

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
IC 601	M 50730-610 SP	3771 47 88
IC 602	BA 6238	3771 47 79

Transistoren/Transistors

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Q 601	DTC 124 F	3614 48 57
Q 602	2 SD 638 R	3614 36 56
Q 603	2 SD 637 R	3614 47 12
Q 604	2 SD 880 YGR 102	3614 49 74
Q 605	DTA 144 F	3614 48 95

Dioden/Diodes

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
D 601	MA 165	3656 29 25
D 602	RD 7,5 ES-T1B2	3656 29 20
D 603	MA 165	3656 29 25
D 604	RD 5,6 ES-T1B3	3656 29 17
D 605-614	MA 165	3656 29 25
D 615	RD 8,2 ES-T1B2	3656 29 21
D 617-620	MA 165	3656 29 25
D 623	RD 12 ES-T1B3	3656 29 13
D 628	1 S 2473	3656 08 56

Widerstands-Netzwerke/Resistor Arrays

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
RA 601		3722 25 56
RA 602		3722 25 57

Elkos/Electrolytic Capacitors

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
C 604	4,7 uF 25 V	3422 41 05
C 607, 611	33 uF 16 V	3421 09 54
C 612	10 uF 16 V MIN	3422 85 30
C 614	10 uF 25 V MIN	3422 86 42
C 619	0,33 uF 50 V	3422 87 07

Filter/Filters

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
CF 601		4552 92 49

0 3 Anschlußbuchsen-Platte
Terminal Board Assembly

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
	Scart-Anschlußplatte Terminal Board Assy	4144 81 66

Integrierte Schaltungen/Integrated Circuits

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
IC 1	TA 7348 P	3771 45 42

Transistoren/Transistors

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Q 1	2 SC 2021 RS	3614 47 18
Q 2	2 SA 937 R	3614 48 92
Q 3	2 SC 2021 RS	3614 47 18
Q 4	2 SB 643 RS	3614 47 05

Dioden/Diodes

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
D 1	HZ 7B1L	3656 27 65
D 2-17	MA 165	3656 29 25

Elkos/Electrolytic Capacitors

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
C 3	47 uF 16 V MIN	3422 85 42
C 5-7	47 uF 10 V SMI	3422 86 39

Spulen/Coils

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
L 1		4543 93 06

0 4 Tuner/ZF-Platte
Tuner/ IF-Board Assembly

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
	Tuner	5823 07 27

Integrierte Schaltungen/Integrated Circuits

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
IC 1	M 51316 BP	3771 47 76

Transistoren/Transistors

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Q 1	2 SC 2636 T	3614 48 72
Q 2	2 SA 1254 B	3614 49 93
Q 3	2 SD 638 R	3614 36 56
Q 6	2 SD 1330 S,T	3614 52 02
Q 7	DTC 144 F	3614 48 70
Q 9-11	2 SB 810 H,J	3614 52 01
Q 12	2 SB 644 R	3614 36 33
Q 13-17	2 SD 637 R	3614 47 12
Q 18	2 SB 644 R	3614 36 33

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Dioden/Diodes		
D 1	RD 6,8 ES-T1B2	3656 29 19
D 3	1 SS 133	3656 22 30
D 6	LTZ-MR 15	3681 16 75
D 7	HZT 33-02	3656 27 61
D 8-14	1 SS 133	3656 22 30
Trimmer-Widerstände/Trimmer Resistors		
R 10	4,7 kOhm	3111 85 97
R 32	3,3 kOhm	3111 86 50
R 40	10 kOhm	3111 85 96
Elkos/Electrolytic Capacitors		
C 5	10 uF 16 V MIN	3422 85 30
C 6	4,7 uF 25 V	3422 41 05
C 9	10 uF 16 V MIN	3422 85 30
C 16	33 uF 16 V	3421 09 54
C 20	1 uF 50 V	3422 08 14
C 27	10 uF 16 V MIN	3422 85 30
C 29	33 uF 16 V	3421 09 54
C 30, 39, 40	10 uF 16 V MIN	3422 85 30
C 41	1 uF 50 V	3422 08 14
C 42	3,3 uF 50 V	3422 08 61
C 44	10 uF 16 V MIN	3422 85 30
C 45	100 uF 16 V	3422 27 84
C 48	0,47 uF 50 V	3422 61 52
C 52	10 uF 63 V	3422 65 32
C 62, 63	10 uF 16 V MIN	3422 85 30
C 67	4,7 uF 25 V	3422 41 05
Spulen/Coils		
L 1		4543 18 48
L 3		4543 95 29
L 4		4543 18 49
L 5		4543 96 27
L 6		4543 96 26
L 7		4543 96 37
L 8		4543 96 35

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Filter/Filters		
T 1		4552 91 92
T 2		4552 91 93
T 3		4552 93 06
T 4		4552 90 68
T 5		4552 92 57
CF 1		4552 92 96
CF 2		4552 92 95
CF 3		4552 90 64
SAW 1		4552 91 85

0 8 Kopftrommelmotor-Ansteuerverstärker Head MDA Board Assembly

Integrierte Schaltungen/Integrated Circuits		
IC 1	AN 66 71 K	3771 46 70
Transistoren/Transistors		
Q 1	2 SB 1052	3614 49 94
Dioden/Diodes		
D 1	RD 5,1 ES-T1B	3656 29 15
Widerstände/Resistors		
R 20	0,68 Ohm	3151 81 57
Elkos/Electrolytic Capacitors		
C 4-6	2,2 uF 50 V	3422 61 53
C 12	10 uF 25 V MIN	3422 86 42

1 0 Antennenverstärker/HF-Modulator Mix Booster/RF Converter

1 0	Antennenverstärker/ Modulator Mix Booster/RF Conv.	5826 01 83

1 2 Audio-Synchronkopfplatte A/CTL Head Board Assembly

1 2	Audio-Synch.kopfplatte unbestückt/unfitted A/CTL Head Board	6948 01 52

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.

1 3 Bandende-Sensorplatte End Sensor Board Assembly

1 3	Bandende-Sensorplatte unbestückt/unfitted End Sensor Board	6948 01 35
Transistoren/Transistors		
Q 1	PT 352 VA	3614 49 17

1 4 Fädelsensor-Platte Loading Sensor Board Assy.

1 4	Fädelsensor-Platte bestückt/outfitted Loading Sensor Board	6913 28 15
Transistoren/Transistors		
	Photosensor	3683 10 76

1 5 LED-Cassettensensorplatte Cassette LED Board Assembly

1 5	Cassetten-LED-Platte unbestückt/unfitted Cassette LED Board	6943 40 45
LED/LED		
D 1	GL 450	3681 16 41
Allgemeine Bauteile/General Parts		
	LED-Halter LED Holder	8681 36 96

1 6 Fernbedienungs-Platte Infrared Board Assembly

1 6	IFR-Empfängerplatte bestückt/outfitted IFR Board Assy.	6913 28 17
Integrierte Schaltungen/Integrated Circuits		
IC 1	LA 7225	3771 46 83
Dioden/Diodes		
D 4	HP-5FR2	3656 29 26
Spulen/Coils		
L 1		4543 18 50

1 8 Cassettenschacht-Sensorplatte Cassette Housing Sens. Board Assy.

1 8	Cassettenschacht-Sensor Platte unbestückt/unfitted Cassette Housing Board	6948 01 43
Transistoren/Transistors		
Q 1	PT 352 VA	3614 49 17

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.

2 0 Verbindungsplatte Deck Terminal Board Assy.

2 0	Verbindungs-Platte bestückt/outfitted Deck Terminal Board	6913 28 14
Transistoren/Transistors		
Q 1	2 SD 636 Q	3614 36 78
Dioden/Diodes		
D 1	1 SS 133	3656 22 30

2 2 Aufwickelsensor-Platte Take up Sensor Board Assy.

2 2	Aufwickelsensor-Platte bestückt/outfitted Take Up Sensor Board	6913 28 16
Transistoren/Transistors		
Q 1	GP 2 L 04 B,D	3683 10 77
Dioden/Diodes		
D 3	HZS 5,6 EB 1	3656 29 27
Allgemeine Bauteile/General Parts		
	Halter Holder	8681 38 05

3 0 Steuermotor-Platte Mode CTL Motor Board Assy.

3 0	Steuermotor-Platte unbestückt/unfitted Mode CTL Motor Board	6948 01 53
Elkos/Electrolytic Capacitors		
C 1	1 uF 50 V	3422 08 14

3 1 Spannungs-Schalterplatte Power Switch Board Assy.

Transistoren/Transistors		
Q 2	2 SD 636 Q	3614 36 78
Dioden/Diodes		
D 1	SLP 981 C-50	3681 16 68
D 5	MA 165	3656 29 25
Elkos/Electrolytic Capacitors		
C 2	47 uF 25 V	3422 37 52
C 4-6	47 uF 63 V MIN	3422 86 54

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Tast-Schalter/Tact Switches		
S 1, 3	Power, Eject	4112 95 34
Allgemeine Bauteile/General Parts		
	LED-Halter LED Holder	8681 37 14

3 2 Anzeige-Platte Display Board Assy.

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Integrierte Schaltungen/Integrated Circuits		
IC 301	MN 1250 BJC	3771 47 89
Transistoren/Transistors		
Q 301-304	2 SD 638 R	3614 36 56
LED/LED		
D 301-312	SLR 34 MT 4	3681 16 69
Dioden/Diodes		
D 313	HZS 7,5 EB 1	3656 29 11
D 315	1 SS 132	3656 28 89
Elkos/Electrolytic Capacitors		
C 302	0,47 uF 50 V MIN	3422 85 56
Tast-Schalter/Tact Switches		
S 204, 205	CH+ CH-	4112 95 34
Allgemeine Bauteile/General Parts		
	Display	3686 10 82
	Display-Halter Display Holder	8681 38 06
	LED-Halter LED Holder	8681 38 07

3 3 Bedienteil-Platte Operation Board Assy.

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Integrierte Schaltungen/Integrated Circuits		
IC 101	M 50115 AP	3771 41 28
Transistoren/Transistors		
Q 101	2 SD 636 Q	3614 36 78
Dioden/Diodes		
D 207	MA 161 FV	3656 22 43
Trimmer-Widerstände/Trimmer Resistors		
R 202	100 kOhm	3111 86 02
R 203	250 kOhm	3112 97 40
R 204	10 kOhm	3112 97 41
Filter/Filters		
CF 101		4552 90 35
Tast-und Schiebeschalter/Tact and Slide Switches		
S 101-106		4112 95 33
S 201, 202		4112 94 32
S 203		4112 95 47
S 206-211		4112 95 34
S 212, 213		4112 95 33
S 214		4112 95 34
S 215		4112 95 33
Allgemeine Bauteile/General Parts		
	Platten-Halter PWB Holder	8681 38 08

3 4 Timer-Platte Timer Board Assy.

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Integrierte Schaltungen/Integrated Circuits		
IC 401	HD 614042 SB 27	3771 47 83
IC 402	TL 066 CP	3771 45 66
Transistoren/Transistors		
Q 401	2 SD 638 R	3614 36 56
Q 402	DTC 144 WF	3614 48 71
Q 403	DTA 114 ES	3614 52 03
Dioden/Diodes		
D 202-205	MA 161 FV	3656 22 43
D 401	MA 150	3656 08 58
D 403	LED/LTZ-MR 15	3681 16 75
D 404	RD 5,6 ES-T1B3	3656 29 17
D 405-407	MA 150	3656 08 58
Widerstände/Posistor		
R 423	PTC/Posistor	3172 91 79

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Netzwerke/Resistor Arrays		
RA 401		3722 25 58
RA 402		3722 11 13
Elkos/Electrolytic Capacitors		
C 403	3,3 uF 25 V MIN	3422 85 41
C 404	Speicher-Elko Back Up Cap.	3422 87 17
C 405, 408	0,47 uF 50 V	3422 61 52
C 409	3,3 uF 25 V MIN	3422 85 41
Allgemeine Bauteile/General Parts		
X 401	Quarz/Crystal Block	4421 24 13

Presetter 35

Transistoren/Transistors		
Q 501-512	DTC 114 F	3614 48 68
Dioden/Diodes		
D 501-512	1 SS 133	3656 22 30
D 518-529	1 SS 132	3656 28 89
Schiebe-Schalter/Slide Switches		
S 2		4112 95 46

3 5 Abstimm-Platte Presetter Board Assy.

Integrierte Schaltungen/Integrated Circuits		
IC 1	TC 4013 BP	3771 47 65
Transistoren/Transistors		
Q 1	2 SB 644 R	3614 36 33
Dioden/Diodes		
D 1-3	MA 167	3656 28 78

3 8 Display-Zwischenplatte Display Sub Board

Positions-Nr. Reference-No. Numéro de pos.	Gegenstand Description Description	Bestell-Nr. Part-No. No. de comm.
Integrierte Schaltungen/Integrated Circuits		
IC 1	TC 4013 BP	3771 47 65
Transistoren/Transistors		
Q 1	2 SB 644 R	3614 36 33
Dioden/Diodes		
D 1-3	MA 167	3656 28 78

Positions-Nr. Reference-No. Numéro de position	Bestell-Nr. Part-No. Numéro de commande

M 1 Gehäuse Cabinet Assembly

Videorecorder 3906

P 1, 31-52	6418 37 09
P 5	6134 46 56
P 6,7-8	6134 46 57
P 9	6123 08 83
P 12	6134 46 60
P 13	6134 46 61
P 14	7358 25 14
P 15	7358 25 52
P 23	8681 23 24

Videorecorder 3916

P 1,31-52	6418 37 08
P 5	6134 46 56
P 6,7-8	6134 46 57
P 9	6123 08 83
P 12	6134 46 60
P 13	6134 46 61
P 14	7358 25 14
P 15	7358 25 52
P 23	8641 23 24

Telerecorder 4906

P 1	6418 37 10
P 5	6134 46 53
P 6,7-8	6134 46 54
P 9	6123 08 83
P 12	6134 46 60
P 13	6134 46 61
P 14	7358 25 14
P 15	7358 25 52
P 23	8641 23 24

Telerecorder 4916

P 1	6418 37 06
P 5	6134 46 53
P 6,7-8	6134 46 54
P 9	6123 08 83
P 12	6134 46 60
P 13	6134 46 61
P 14	7358 25 14
P 15	7358 25 52
P 23	8641 23 24

Tastenkappen/Buttons VR 3906,3916

P 3	⏲	6318 34 69
P 31	⊙	6318 34 70
P 32	⏏	6318 34 71
P 33	C △	6318 34 72
P 34	C ▽	6318 34 73
P 35	◁◁	6318 34 74
P 36	▶	6318 34 75
P 37	▷▷	6318 34 76
P 38	■	6318 34 77
P 39	‖	6318 34 78
P 40	●	6318 34 79
P 41	▷	6318 34 80
P 42	▷0◁	6318 34 81
P 43	[000] ◕	6318 34 82
P 44	[M]	6318 34 83
Feder für 44 Spring for 44		7358 23 10
Halter für 44 Holder for 44		8681 36 88
P 48		6134 46 62

Tastenkappen/Buttons TR 4906,4916

P 3	⏲	6318 34 69
P 31	⊙	6318 34 84
P 32	⏏	6318 34 85
P 33	C △	6318 34 72
P 34	C ▽	6318 34 73
P 35	◀◀	6318 34 86
P 36	▶	6318 34 87
P 37	▶▶	6318 34 88
P 38	■	6318 34 89
P 39	‖	6318 34 90
P 40	●	6318 34 91
P 41	▷0◁	6318 34 92
P 42	[000] ◕	6318 34 93
P 43	▷	6318 34 94
P 44	[M]	6318 34 95
Feder für 44 Spring for 44		7358 23 42
Halter für 44 Holder for 44		8681 36 88
P 49		6134 46 65

M 2 Chassis Chassis Assembly

P 21	4335 92 26
P 23, 24-28	4335 92 33
P 24	3178 10 05
P 26	4335 92 27
P 28	7338 20 23
P 32	6273 40 51
P 33	8681 37 97
P 35	7358 23 38
P 36	4511 33 45
P 43	8318 47 53
P 62	8681 37 98
P 63	4147 04 92

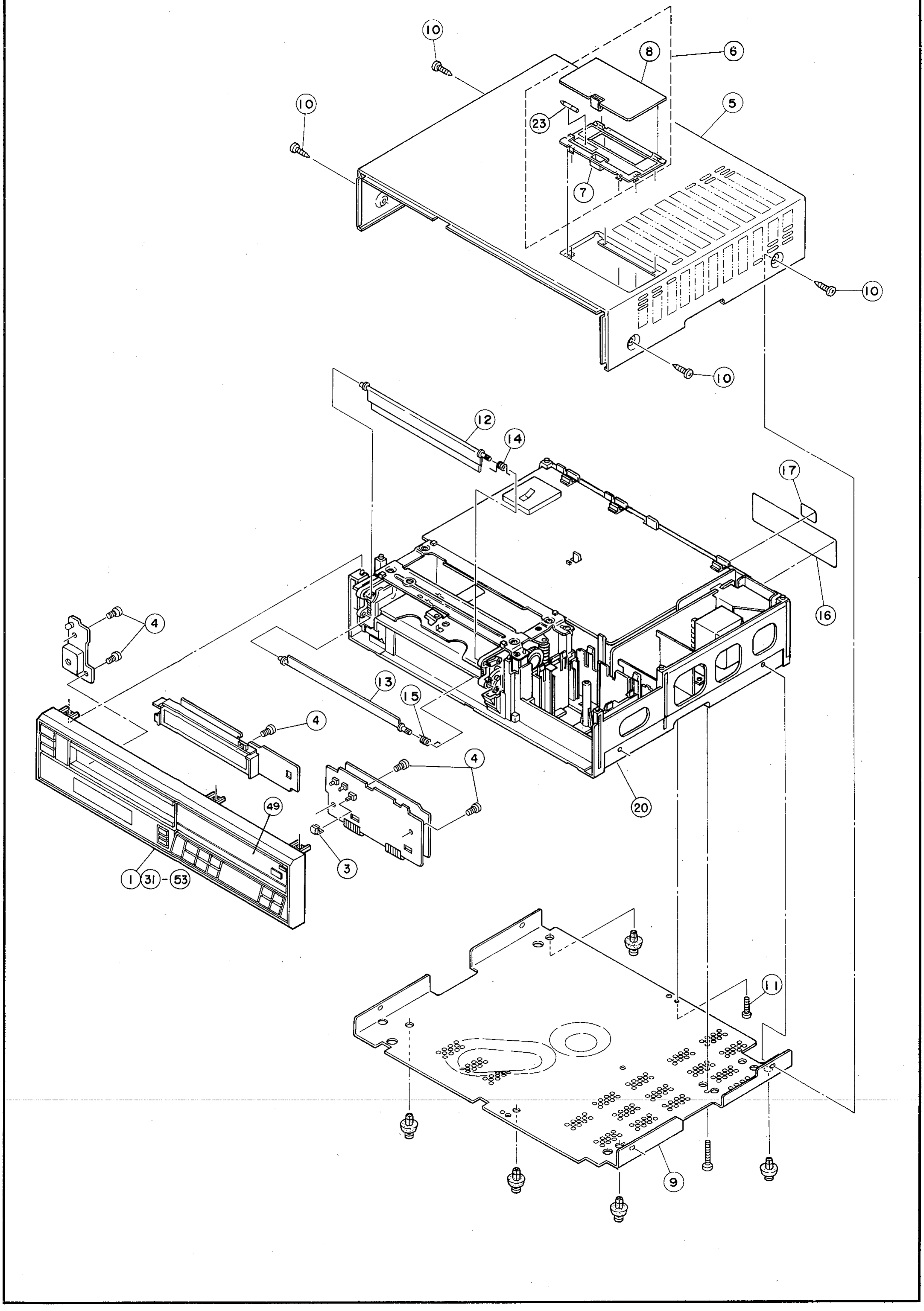
M 3 Chassis kpl. (1) Mechanism Assy. (1)

P 2	8681 37 99
P 3	8681 38 09
P 7,8	7525 10 34
P 9,10	7525 10 35
P 10	7358 24 28
P 14	7525 10 45
P 16	7525 10 46
P 18	7525 10 17

Positions-Nr. Reference-No. Numéro de position	Bestell-Nr. Part-No. Numéro de commande
P 19	7525 10 18
P 21, 22-27	7548 41 86
P 22	7358 24 36
P 23	7358 24 37
P 24	4432 91 95
P 27	7618 42 08
P 29	8318 45 84
P 32	8681 38 02
P 34	7538 33 45
P 37	8318 47 54
P 39	7358 23 39
P 40	8318 47 11
P 42, 43-45	8318 47 55
P 43	4337 91 58
P 45	7358 24 30
P 46	7358 24 31
P 47	8318 45 78
P 50	8318 47 56
P 51	4335 92 34
P 52	7358 34 16
P 60	8318 45 78
P 63, 64	8681 36 98
P 64	7358 24 39
P 66, 67	8681 36 99
P 67	7358 24 40
P 69	8681 38 03
P 70	7358 24 42
P 72	6253 41 54
P 73	6253 41 55
P 76, 77-78	8681 37 05
P 77	7358 24 43
P 78	7358 24 44
P 80, 81-82	8681 37 06
P 81	7358 24 43
P 82	7358 24 44
P 84	8318 47 57
P 86	7358 24 45
P 87	8318 45 87
P 89, 90-95	6253 41 56
P 90	6253 41 57
P 91	6253 41 58
P 94	7358 24 46
P 95	7358 24 47
P 97, 98	8318 47 58
P 98	7358 23 40
P 100	8681 38 04
P 101	7358 23 41
P 103	8318 47 59
P 105	8318 47 08
P 109	4432 92 06
P 111	7618 42 07
P 112	7338 20 24
P 114	7358 24 49

M 4 Cassettenschacht
Cassette Housing Assy.

Positions-Nr. Reference-No. Numéro de position	Bestell-Nr. Part-No. Numéro de commande
P 1-67	8318 45 53
P 3	7525 09 79
P 4	7525 09 80
P 6, 7	8681 24 35
P 7	7358 25 32
P 8	8681 24 36
P 9	7525 09 81
P 11	7525 09 82
P 12	7525 09 83
P 13	7525 09 84
P 14	7525 09 85
P 15	7358 25 33
P 16	7525 09 94
P 18	4432 91 70
P 19	4654 60 58
P 20	7525 09 87
P 23	8681 24 37
P 24	8681 24 38
P 25	8681 36 21
P 27	4112 94 31
P 28	4112 94 35
P 33	8681 23 06
P 35, 36	8318 44 58
P 36	7358 25 34
P 37, 38	8318 45 88
P 38	7358 25 34
P 46	7358 25 35
P 47, 48-49	8681 37 83
P 50	8681 24 40
P 51	8681 24 41
P 52	8681 24 42
P 53	7358 25 36
P 54	4112 95 30
P 55	4112 95 31
P 57	7538 33 30
P 61	8318 47 10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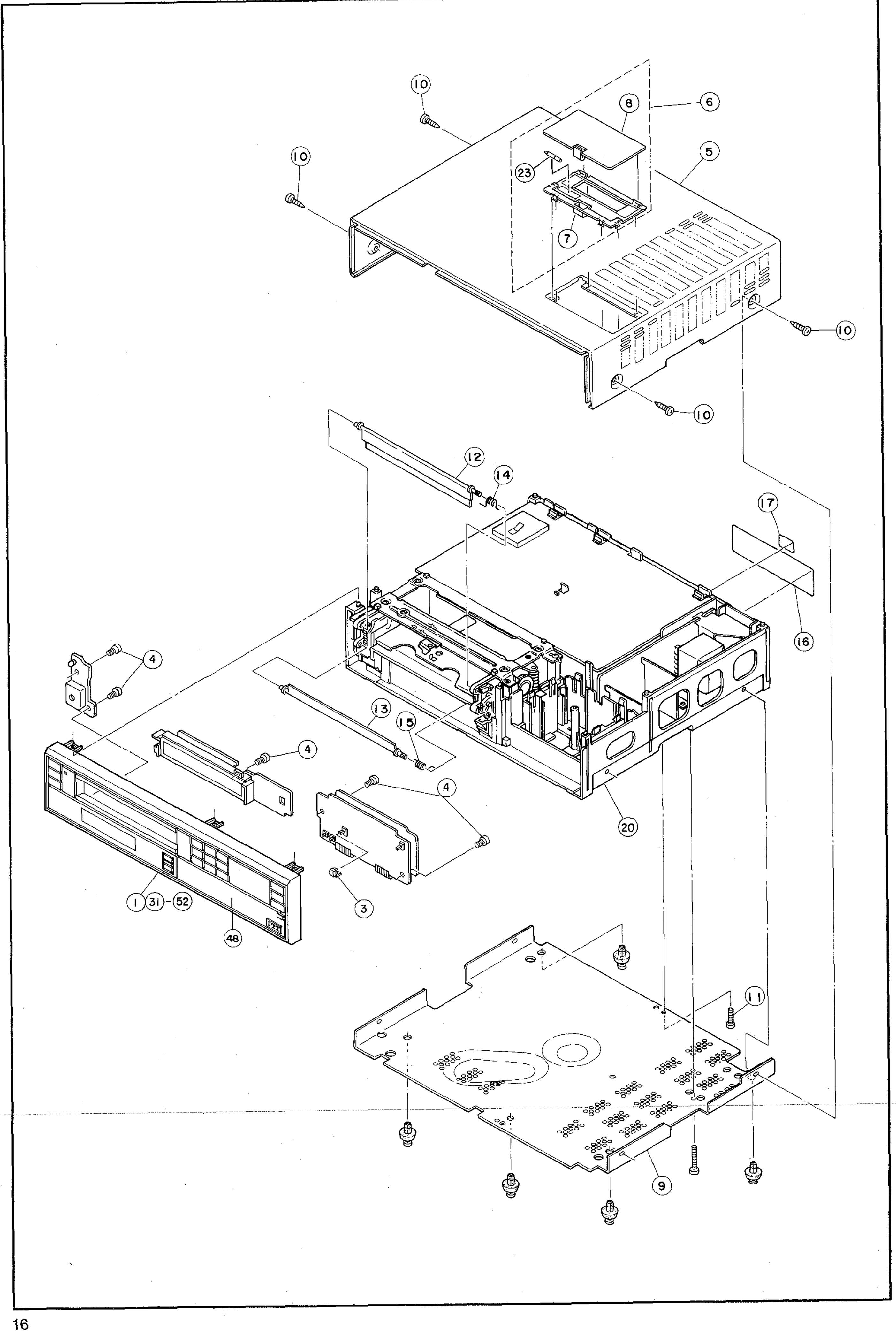
M **1**

Gehäuse
Cabinet Assembly

Videorecorder 3906
Videorecorder 3916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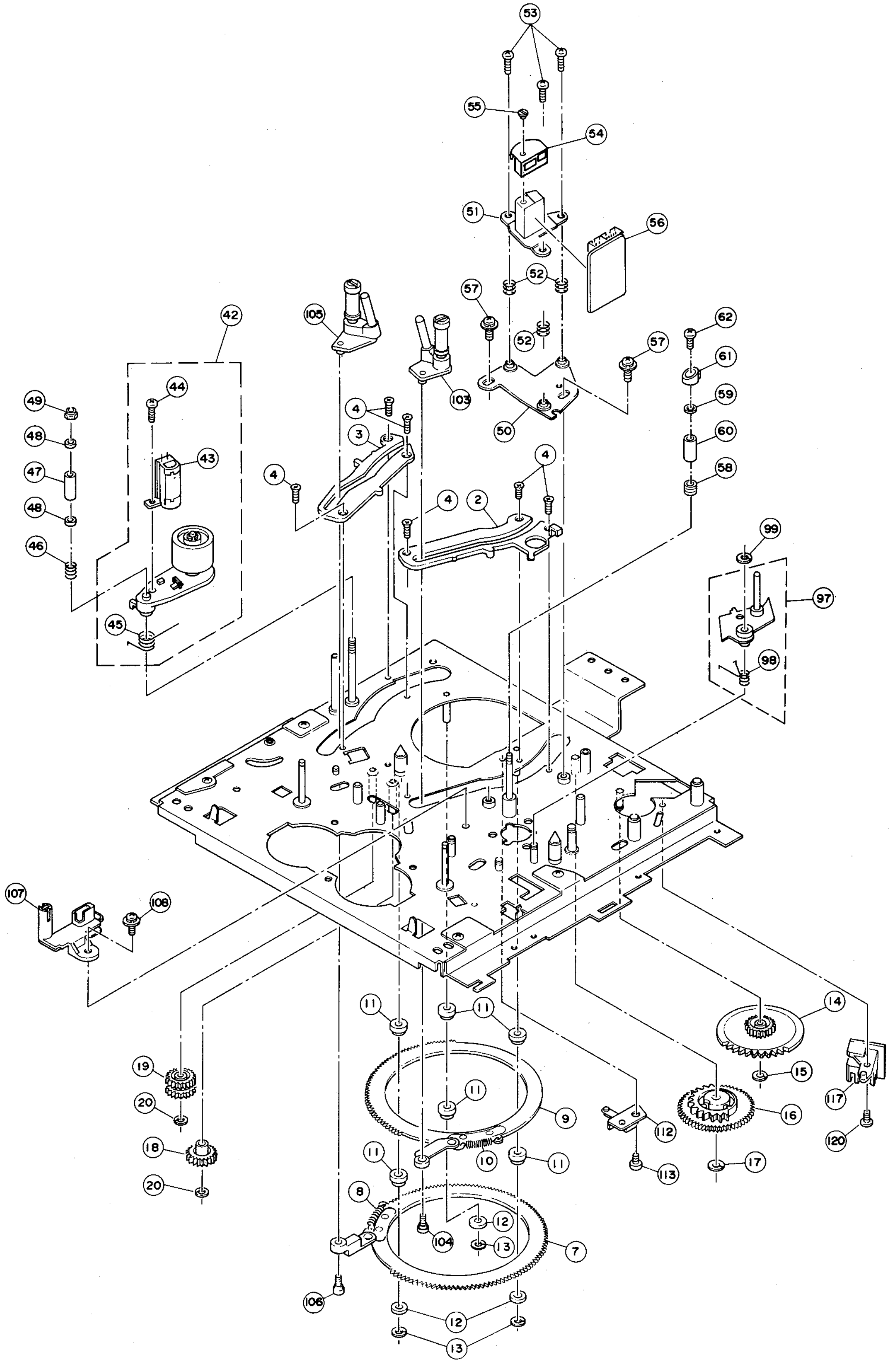
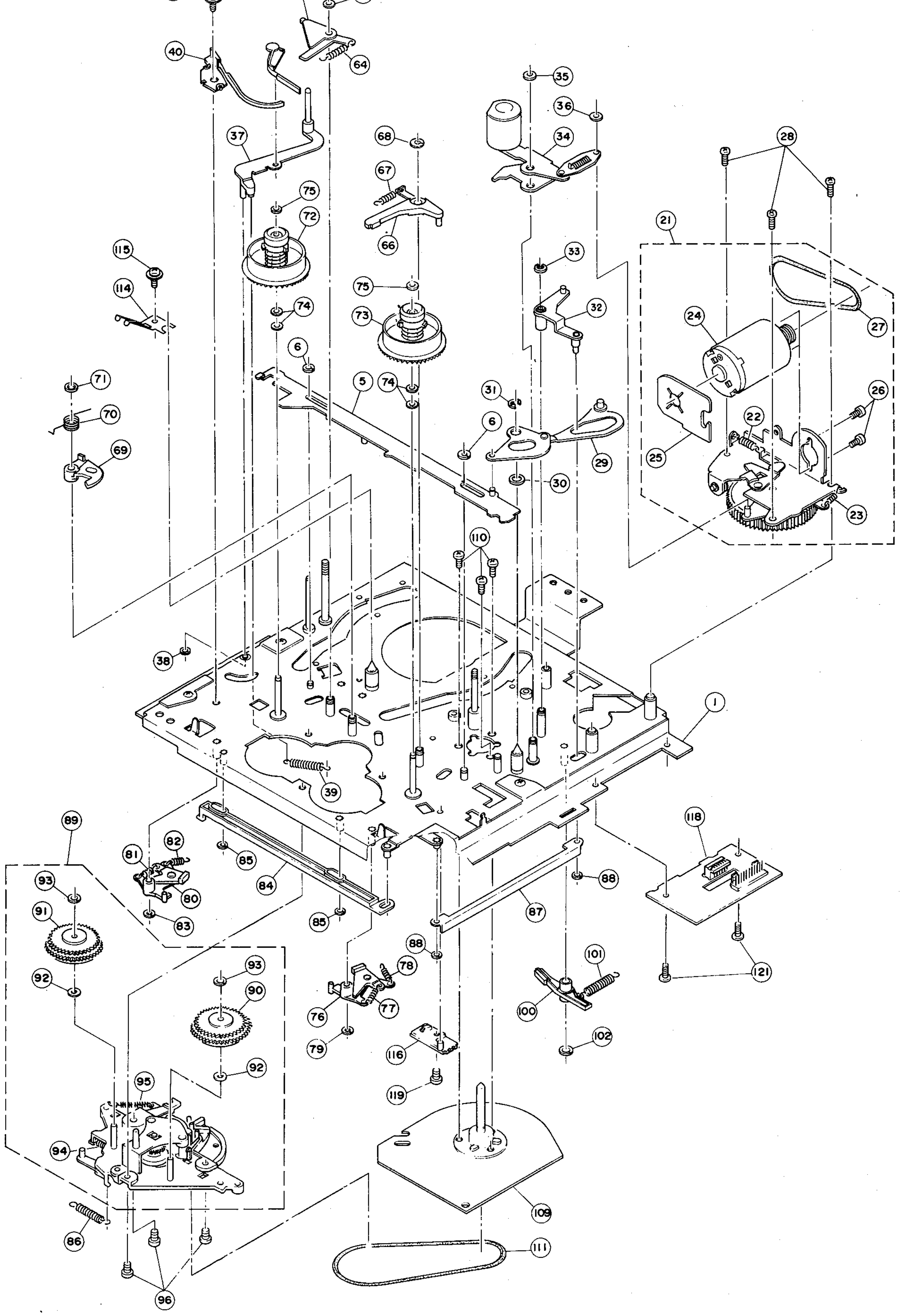
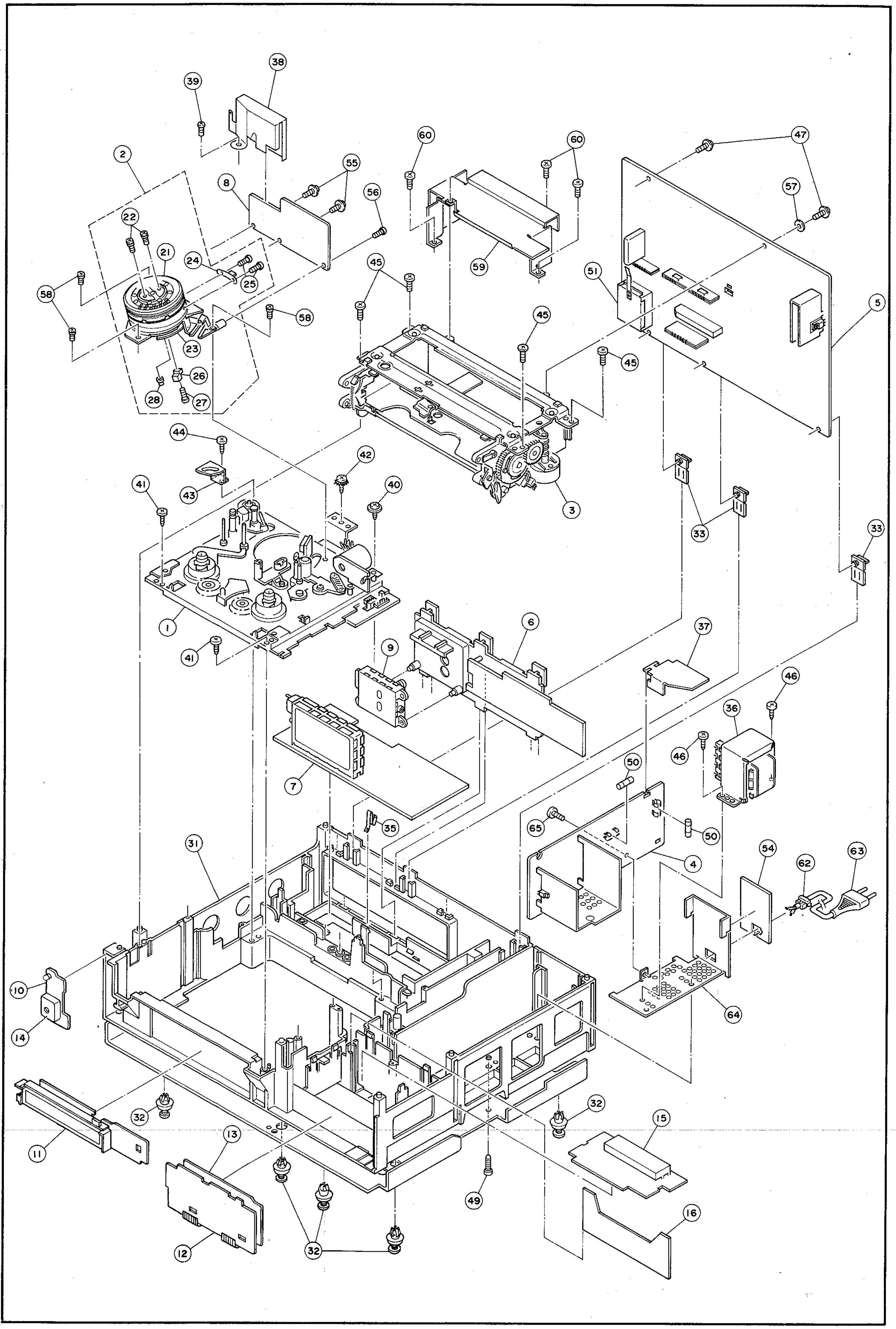




M 2 Chassis
Chassis Assy.

Videorecorder 3906, 3916
Telerecorder 4906, 4916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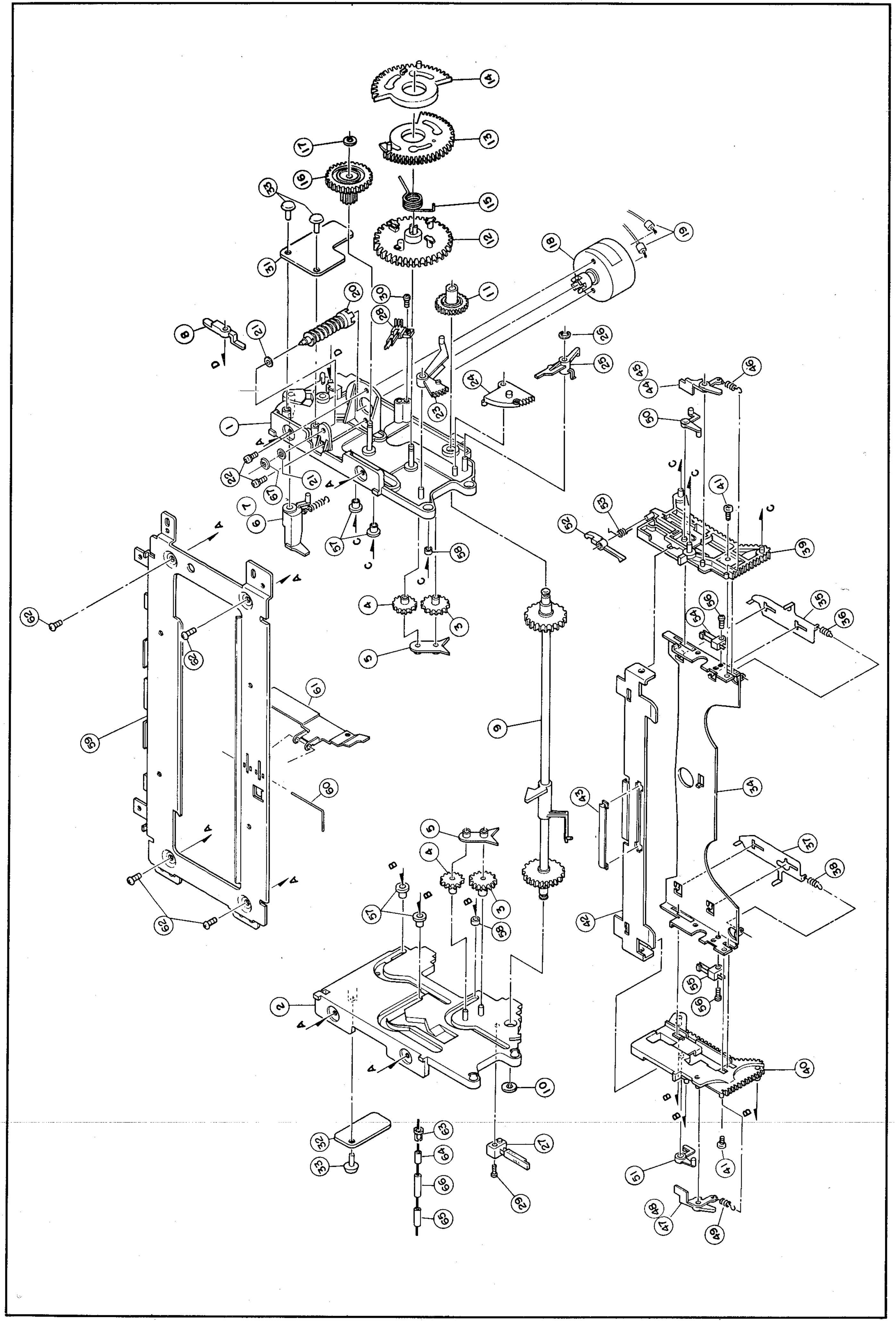
M 4 Cassettenschacht
Cassette Housing Assy.

Videorecorder 3906, 3916
Telerecorder 4906, 4916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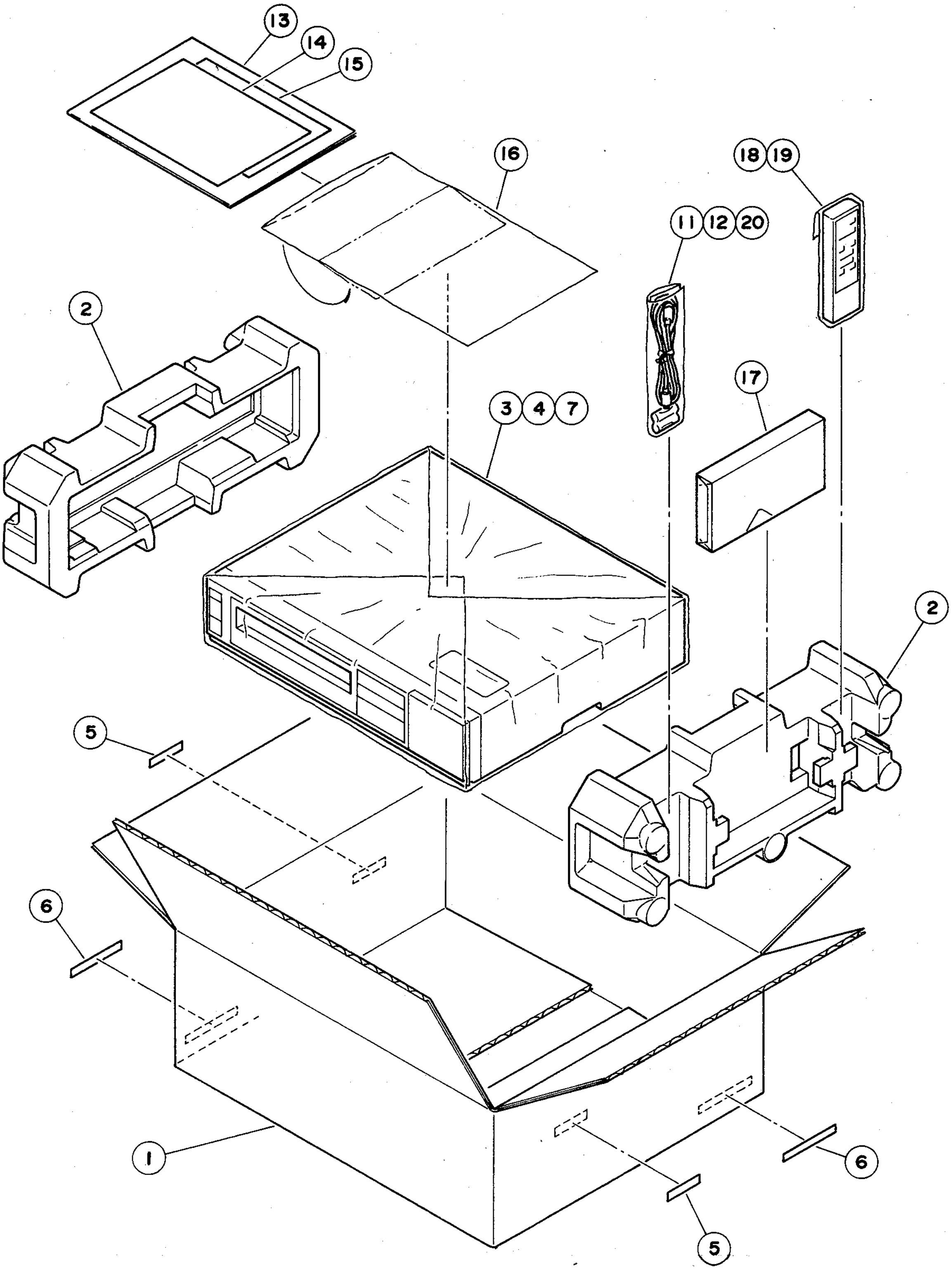
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